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Rogue-Grants Pass Watershed Analysis

Grants Pass, 1884. Percy T. Booth collection

REO Watershed #1710030804

U.S. Department of the Interior
Bureau of Land Management
Medford District
Grants Pass Resource Area

August 1998

99-031322

8/21/98 - Version 1.0

C

As the Nation's principal conservation agency, the Department of the Interior has responsibility for most of our nationally owned public lands and natural resources. This includes fostering the wisest use of our land and water resources, protecting our fish and wildlife, preserving the environmental and cultural values of our national parks and historical places, and providing for the enjoyment of life through outdoor recreation. The Department assesses our energy and mineral resources and works to assure that their development is in the best interest of all our people. The Department also has a major responsibility for American Indian reservation communities and for people who live in Island Territories under U.S. administration.

BLM/OR/WA/PT-99/034+1792

I

ROGUE - GRANTS PASS

WATERSHED ANALYSIS

(REO WATERSHED #1710030804)

U.S. Department of the Interior
Bureau of Land Management
Medford District
Grants Pass Resource Area

AUGUST 1998

8/21/98 - Version 1.0

II

August 1998

Dear Reader:

The purpose of this watershed analysis is to identify the various ecosystem components in the Grants Pass - Rogue River fifth field watershed and their interactions at a landscape scale. It looks at historical ecological components, current ecological components and trends. It makes recommendations for future management actions that are needed to reach recommended ecological conditions.

As you read this document, it is important to keep in mind that the watershed analysis process is an iterative and ongoing process. As new information becomes available it will be included and updating will occur. It is also important to keep in mind that this analysis document is ***not*** a decision document. Recommendations outlined in this watershed analysis are a points of departure for project specific planning and evaluation work. Project planning then includes the preparation of environmental assessments and formal decision records as required by National Environmental Policy Act (NEPA). Project planning and land management actions would also be designed to meet the objectives and directives of our Medford District Resource Management Plan (RMP).

This watershed analysis will thus be used as a tool in land management planning and project implementation within the Grants Pass watershed on BLM-administered lands. Although ecological information, discussions and recommendations are presented at the landscape scale irrespective of administrative ownership, please understand that the BLM will only be implementing management actions on the lands it administers.

Preparation of this watershed analysis follows the format outlined in the federal watershed analysis guidelines found in the document entitled *Ecosystem Analysis at the Watershed Scale: Federal Guide For Watershed Analysis, Version 2.2* (August 1995).

If you have additional resource or social information that would contribute to our better understanding the ecological and social processes within the watershed, we would appreciate hearing about them.

Robert C. Korfhage
Field Manager
Grants Pass Resource Area

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IX

INTRODUCTION

Preparation of watershed analyses is a key part of the implementation of the 1994 Northwest Forest Plan (NFP). Watershed analysis is to be conducted at a fifth field watershed scale. It is a procedure with the purpose of developing and documenting a scientifically-based understanding of the ecological structure, functions, processes and interactions occurring within a watershed. It is one of the principal analysis used to meet the ecosystem management objectives of the NFP's Standards and Guidelines. It is an analytical process, not a decision-making process. A watershed analysis serves as a basis for developing project-specific proposals, monitoring and restoration needs of the particular watershed. Watershed analysis is designed to be a systematic procedure for characterizing watershed and ecological process in a manner useful to meeting specific management and social objectives.

This watershed analysis will thus document the physical and biological conditions of the Grants Pass Watershed, both past and present. It will provide some interpretation of the data, identify trends, and make recommendations on managing this watershed toward a desired future condition.

The first part of this analysis will address the core physical, biological and human features that characterize the watershed and their important ecological functions. Regulatory considerations that influence resource management on federal lands in the watershed will also be identified. From this, key issues will be identified. The purpose of these key issues is to focus the analysis on the important functions of the ecosystem that are most relevant to the management questions, human values, or resource conditions within the watershed.

Next, current and reference conditions of these important ecosystem functions will be described. An attempt to explain how and why ecological conditions and processes have changed over time will be made during the synthesis portion of the analysis.

The final portion of the analysis outlines some recommendations on how to manage the resources in the Grants Pass Watershed in order to move them from their current condition toward the desired future condition. These recommendations will also take into account current land management constraints.

This watershed analysis follows the approach outlined in the *Federal Guide for Watershed Analysis (Version 2.2, 1995).*

Two key management documents are frequently referred to throughout this analysis:

1. *The Record of Decision for Amendments to Forest Service and Bureau of Land Management Planning Documents within the Range of the Northern Spotted Owl* and its Attachment A entitled the *Standards and Guidelines for Management of Habitat for Late-Successional and Old-Growth Forest Related Species within the Range of the Northern Spotted Owl* (April 13, 1994), (NFP-ROD); and

2. The *Final Environmental Impact Statement* (EIS) and *Record of Decision* dated June 1995 for the Medford District Resource Management Plan (October 1994), (RMP-ROD).

Grants Pass Watershed Analysis Team Members

The following resource professionals worked as members of the watershed analysis team:

Tom Dierkes -- Vegetation
Matt Craddock -- Cultural/Minerals
Dale Johnson -- Aquatic Habitat
Jeanne Klein -- Recreation
Doug Lindsey -- Roads and Transportation
Dave Maurer -- Soil/Water, Team Lead
Linda Mazzu -- Botany and Special Status Plants
Dennis Glover -- Geographic Information
Tom Murphy -- Fuels and Fire
Kip Wright -- Wildlife

I. CHARACTERIZATION

A. PURPOSE

The purpose of this chapter is to identify and to provide an overview of the dominant physical, biological and human processes and features of the watershed that affect ecosystem function or condition; to relate these features and processes with those occurring in the river basin or province; to provide the watershed context for identifying elements that need to be addressed in the analysis; and to identify, map and describe the land allocations, the forest plan objectives and the regulatory constraints that influence resource management in the watershed. Further discussion and elaboration of some of these processes and features will take place in Chapter III, Current Condition.

B. INTRODUCTION

The Grants Pass Watershed (5th field watershed) is located within the Klamath Mountain Geomorphic Province of southwestern Oregon in Josephine County (see Maps 1 and 2 in Appendix A). Approximately 14 million years ago this area began uplifting and has been shaped, primarily by water, into a mountainous bowl with a large valley floor. This bowl ranges in elevation from 860 feet to nearly 4,000 feet. There are approximately 630 miles of waterways, all of which drain into the Rogue River. Approximately 25% of these waterways provide habitat for salmonids. The watershed's soils have been formed from exposed meta-volcanic and meta-sedimentary, granitic and serpentine rocks and support diverse forest vegetation types. The forests supply wood, recreation, and other special products for human purposes while providing habitats for many species of terrestrial and aquatic wildlife and plants. Many people have settled and developed the toeslopes of the mountains and along the valley floor. The watershed includes the City of Grants Pass.

A fifth field watershed aggregates smaller sixth field watersheds. These are shown on Map 5 in Appendix A.

C. LAND STATUS

1. Ownership

The watershed analysis encompasses all lands within the Grants Pass fifth field watershed. Table I-2 summarizes the land ownership pattern within the watershed. See also Maps 2 and 4 in Appendix A.

Table I-1: Land Status by Ownership Category

Owner	Acres	Percent of Watershed
Federal - BLM	12,539	23%
Federal - USFS	0	0%
State of Oregon	78	0.1%
Josephine County	1,447	3%
Private and other government	39,576	74%
TOTAL	53,640	

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2. County Zoning

Within the private non-industrial ownership the lands are zoned farm/forest with 19,604 acres zoned as lots less than 20 acres in size. These areas are considered by the BLM to be rural interface areas (RIAs) and require varied management activities to reflect this proximity to residences. Approximately fourteen percent (14%) of BLM-administered lands are within one-quarter mile of private lands zoned such that they receive RIA consideration.

3. Grants Pass Urban Growth Area

The entire Grants Pass urban growth area lies within the Grants Pass Watershed and encompasses approximately 8,743 acres.

4. Northwest Forest Plan Land Allocations

The Northwest Forest Plan (*Record of Decision for Amendments to Forest Service and Bureau of Land Management Planing Documents within the Range of the Northern Spotted Owl, and Standards and Guidelines for Management of Habitat for Late-Successional and Old-Growth Forest Related Species within the Range of the Northern Spotted Owl, April 1994*)) and the Medford District's Resource Management Plan (June 1995) made a variety of land use allocations as a framework within which federal land management objectives vary. Together, they are designed to meet the broader objectives of the regional plans. Table I-2 summarizes these allocations as they occur on BLM-administered land within the watershed (see Map 3).

Table I-2: Land Allocations (NFP, RMP) on BLM-Administered Lands			
Land Use Allocation	**BLM Acreage**	**Percent of BLM within the Watershed**	
Congressionally-Reserved Areas	20	0.2%	Rogue Wild and Scenic River Corridor
Late-Successional Reserves	0	0.0%	
Adaptive Management Areas	0	0.0%	
Administratively-Withdrawn Areas		0.0%	
R&PP Lease (Cathedral Hills Park)	430	3.4%	Recreation site managed by Josephine County Parks Department
Merlin Land Fill	14	0.1%	Transferred to the City of Grants Pass
Riparian Reserves	--	--	Specific acreage not determined - included in other allocations
Matrix	12,074	96.3%	
TOTAL (BLM)	**12,538**		

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The Grants Pass fifth field watershed is a non-key watershed with most of the federal lands being designated as "Matrix" under the NFP-ROD. Matrix consists of those federal lands outside the six categories of designated areas: Congressionally Reserved Areas, Late-Successional Reserves, Adaptive Management Areas, Managed Late-Successional Reserves, Administratively Withdrawn Areas, and Riparian Reserves. The matrix allocation is where the scheduled timber harvest activities will be located. It is also where most other silvicultural activities are conducted. In addition to managed forests, the matrix includes both non-forested areas and forested areas that are technically unsuitable for timber production. These unsuitable areas do not contribute to the timber landbase upon which the Probable Sale Quantity (PSQ) is determined. Probable sale quantity estimates the sustainable harvest level given the management decisions of the RMP-ROD.

The Riparian Reserve allocation borders all streams on federal land in the watershed. These areas are a critical part of the NFP's Aquatic Conservation Strategy to restore and maintain the ecological health of watersheds and aquatic ecosystems. The main purpose of the riparian reserve is to protect the health of the aquatic system and its dependent species and to provide benefits to upland species. These reserves help maintain and restore riparian structures and functions, benefit fish and riparian-dependent non-fish species, enhance habitats for organisms dependent on the transition zone between upslope and riparian areas, improve travel and dispersal corridors for terrestrial and aquatic animals and plants, and provide for greater connectivity of late-successional forest habitats (NFP-ROD, p.7).

D. CLIMATE

The Grants Pass Watershed has a Mediterranean climate with cool, wet winters and warm dry summers. Average annual precipitation in the Grants Pass Watershed ranges from approximately 28 inches in the east end of the watershed to 36 inches in the west side of the watershed. Temperatures recorded at the Grants Pass Weather Station show the lowest monthly minimum average occurs in January with a temperature of 32.3° F. The highest average monthly maximum in Grants Pass occurs in July at 89.8° F.

E. AIR QUALITY

Within the Grants Pass Watershed, the City of Grants Pass and its urban growth boundary has two special air quality designations, a special protection zone and designated area.

Special protection zones (SPZs) and designated areas (DAs) were established by the Oregon Smoke Management Plan (OSMP) as part of the State Implementation Plan (SIP) of the Clean Air Act. The SPZ areas incorporate the population centers of Grants Pass, Medford/Ashland, and Klamath Falls which where then in violation of the national ambient air quality standards for PM 10 and are classified as nonattainment areas for this pollutant. The SPZ consists of the nonattainment area itself (identified as the growth boundary of the City of Grants Pass) and an area within approximately a 20-mile radius from the growth boundary edge. Extra restrictions on prescribed burning are imposed when air quality conditions reach "Yellow" or "Red" levels.

Grants Pass currently remains designated as a SPZ. Grants Pass has met the standards necessary for removal of the SPZ designation since 1996 and is awaiting removal by Oregon Department of Environmental Quality (DEQ). Until the removal, all SPZ considerations remain in effect. This designation theoretically places a higher restriction on prescribed burning. In practice there would be little change in prescribed burning procedures as the city remains a designated area (DA). Designated areas are the major population centers, such as the City of Grants Pass and Medford/Ashland. The objectives for a DA is to avoid sustained concentrated smoke intrusions at ground level. In practice this limits burning when weather conditions would allow large volumes of smoke to flow into and remain within the DA.

F. EROSION PROCESSES

1. Dominant Erosion Types

The dominant erosion processes occurring in this watershed are concentrated flow erosion (sheet/rill erosion and gully erosion) and stream channel erosion. Erosional processes within the landscape are driven by gravity and the influence of water (precipitation and runoff) on soil shear strength. Other factors that have influenced the erosion process on the landscape are climate, vegetation and fire. Water erosion is important as it not only detaches soil particles (and sometimes earthen material) but also transports the material downhill.

Concentrated flow erosion is a concern on hill slopes that have had most of the vegetation removed and where roads have concentrated runoff in unconsolidated ditches and diverted it to where surface protection is inadequate. Soil erosion occurs when soil particles are detached by raindrop splash or the overland flow of water and moved to another location on the landscape. Eroded soil particles can move from less than an inch to many miles depending on the topography and vegetative condition of the land. This erosion is of concern because it can reduce the amount of soil on a landscape, thus decreasing the productivity of the land and increasing sediments in local waterways.

Gully erosion occurs in this watershed predominantly on granitic soils where disturbance has occurred. Granitic soils are highly erosive. A small rill can be changed into a two-foot gully in one heavy rainfall event. Gullies can be a major source of sediment in local streams.

Channel erosion occurs as large volumes of water and debris rushes through the waterways dislodging soil particles from the streambanks and transporting them downstream. This type of erosion is important as it can widen a stream channel which may cause the stream to spread and become shallower. Also, the detached soil sediments may deposit in fish spawning gravel or rearing pools reducing habitat effectiveness. High road densities may activate this type of erosion because of increased peak flows that is caused (see Road Density section below). Deep, fine textured soils that occur at the base of upland areas on fans, footslopes, and terraces are most susceptible to channel erosion.

These erosional processes combined with the uplifting of the landscape that has been occurring for the last 14 million years are primarily responsible for the morphological characteristics of the watershed. As the landscape is uplifted, belts of varying rock types are exposed to weathering. The uplifting process occurred faster than the erosional process which has resulted in steeply incised streams (draws) with high gradients in most of the watershed (Rosgen Aa+) and alluviated valley streams with low to moderate gradients and entrenched channels (Rosgen B and F). Riparian areas along these streams provide habitats for plants and animals associated with the aquatic resources. Many of the riparian areas of the streams in the watersheds have been disturbed as a result of past timber harvest, roads or fire.

2. Erosion and Road Density

Road density is the measurement of total road length for a given area, commonly expressed as miles of road per square mile. It is a concern because roads generally intercept surface water and shallow groundwater and route it to natural drainage ways. This concentrates and increases natural runoff and may cause erosion. It may bring sediment to the stream system. Peak stream flows may increase compared to stream flows in areas with few or no roads. Increased peak flows may increase streambank erosion. Road densities in excess of four miles per square mile are considered a high level and will have detrimental cumulative effects on stream water quality and quantity.

G. HYDROLOGY

There are approximately 650 miles of streams in the Grants Pass Watershed including 16 miles of the Rogue River, based on an estimate from incomplete GIS data. The headwaters of tributaries to the Rogue are generally steep and fast flowing, approximately 65% of which are intermittent.

1. Stream Flow

The stream flow in the Grants Pass Watershed fluctuates with the seasonal variation in rainfall. Peak flow events occur during high-intensity storm events of long duration, usually in the winter and early spring. The flows of the Rogue River are heavily affected by storm events, snow melt, and releases or detention of the Lost Creek Dam. The maximum recorded discharge for the Rogue River in Grants Pass was 152,000 cubic feet per second (cfs) on December 23, 1964 [1]. The maximum recorded discharge after flow regulation by Lost Creek Dam (beginning February of 1977) was 90,800 cfs on January 1,1997 [2].

One of the main hydrological characteristics of the Grants Pass Watershed is the very low stream flow of tributary streams during the late summer and early fall. Most of the watershed is below 4,000 feet in elevation and snowpack contributes very little to the late spring and summer water flows. As a result, stream flows are often less than 5 cfs during the late summer and early fall.

H. WATER QUALITY

Water quality varies greatly throughout the Grants Pass Watershed. The Rogue River from the Applegate River to Evans Creek has been identified as water quality-limited on the basis of fecal coliform during the summer and summer temperatures. Bee Creek, a tributary to Savage Creek, has been identified also, based on high summer temperatures. Other tributary streams within the watershed may warrant 303(d) listing, but the lack of data has kept them from being listed. The types of water quality and pollution are detailed in Chapter III, Current Condition.

I. STREAM CHANNEL

The major streams in the Grants Pass Watershed can be classified into four stream types, based on the Rosgen system of stream classification: A, B, C and F. Type A are steep, entrenched, cascading, step/pool streams with high energy transport associated with depositional soils and are very stable if bedrock or boulder-dominated. Type B are moderately entrenched, have a moderate gradient with a riffle-dominated channel and with infrequently spaced pools. They have a very stable plan and profile with stable banks. Type C are moderately meandering with floodplains on one or both sides of the channel. Type F are entrenched, meandering and have a riffle/pool channel on low gradients with high width/depth ratios.

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[1] *U.S. Geological Survey, Open-File Report 93-63, p. 378.*

[2] *Phone Conversation. U.S. Geological Survey Office, Medford, April 3, 1998*

J. VEGETATION

The Grants Pass watershed vegetation conditions are highly variable. These conditions are the result of human and natural influences.

The watershed is characterized by high fire frequencies both historically and to a lesser extent in the present. Fire exclusion has resulted in significant increases in densities (more stems per acre), shifts in species composition (e.g., increases in fire intolerant, shade tolerant species) and changes in stand structure. These transformations have made the forests more susceptible to large, high-severity fires and to epidemic attack by insects and disease in both the upland and riparian areas.

An additional effect on the plant communities in the Grants Pass Watershed has been the result of more direct human influences. Mining, logging, agriculture, road building and residential development have reduced the amount of late-successional forest within the watershed while increasing the amount of early seral stages. Approximately 8,743 acres of the Grants Pass Watershed is included in the Grants Pass urban growth area (GPUGA) and includes the City of Grants Pass (population approximately 17,000). Land use patterns within the GPUGA have drastically affected a large portion of the valley floor by agriculture and grazing, and some of the surrounding foothills, which were historically forested with large Ponderosa pine and Douglas-fir.

The Grants Pass Watershed contains at least six plant series: white oak, Ponderosa pine, Douglas-fir, Jeffrey pine, white fir, and western hemlock. The southeast and north to northeast portion of the watershed is dominated by the Douglas-fir series. At lower elevations Douglas-fir/Ponderosa pine predominate. The northwest portion of the watershed and along the perimeter of the valley floor contain a few areas exclusive to the Ponderosa pine series. The white oak series is present where fires were frequent and on southern exposures. There are isolated and limited amounts of areas containing Jeffery pine, white fir, or western hemlock plant series. (Plant communities (associations) with the same climax dominant(s) are referred to as plant series. The Jeffrey pine series, for example, consists of associations in which Jeffrey pine is the climax dominant (Atzet and Wheeler 1984)).

K. FIRE REGIMES

Fire regimes of the Pacific Northwest are a function of the vegetation growth environment (*e.g.*, temperature and moisture patterns), ignition pattern (lightning or human) and plant species characteristics (*e.g.*, fuel accumulation, adaptations to fire). Effects of forest fires can be described by grouping effects by fire regimes. Agee (1981) describes three broad fire regime categories (these can and often do overlap considerably with one another):

> *High-severity regimes*: Fires are very infrequent (more than 100 years between fires); they are usually high-intensity, stand replacement fires.
>
> *Moderate-severity regime*: Fires are infrequent (25-100 years); they are partial stand replacement fires, including significant areas of high and low severity.

Low-severity regime: Fires are frequent (1-25 years); they are low-intensity fires with few overstory effects.

Fire regimes are the manifestation of the biological, physical, climatic and anthropomorphic components of an ecosystem as reflected in the type, frequency and size of fires (Pyne 1982). This is a relationship that perpetuates itself in a circular and stable pattern. The biotic components are an expression of the fire regime, and in turn maintain the pattern and occurrence of the fire. However, when any components of the ecosystem are modified, the fire regime is prone to change.

The persistence of certain species in southwestern Oregon through the millennia can be attributed to their adaptations to fire (Kauffman 1990). Adaptations for fire survival are adaptations to a particular ecosystem and its specific fire regime. If the regime is altered, the capacity for that species to survive in the environment may be greatly changed.

1. Fire Disturbance

The fire regime for the Grants Pass Watershed has historically been a low-severity one. Fires in a low-severity regime are associated with ecosystem stability, as the system is more stable in the presence of fire then in its absence (Agee 1990). Frequent, low-severity fires keep sites open so that they are less likely to burn intensely even under severe fire weather.

With the advent of fire exclusion/suppression, the historic pattern of frequent low-intensity fire ended. Dead and down fuel and understory vegetation are no longer periodically removed. This creates a trend toward ever increasing amounts of available fuels present. The longer interval between fire occurrence creates higher intensity, stand replacement fires rather than the historical low-intensity stand maintenance fires.

It is important to recognize that each vegetation type is adapted to its particular fire regime and not to any fire regime (Agee 1981). The significance of this is that the historical vegetation types that existed prior to Euro-American settlement cannot be maintained in the present fire regime that has resulted from fire exclusion.

2. Fire Risk

Human actions greatly influence the pattern of fire occurrence and number of fires in the watershed. The watershed as a whole has a high level of risk of human caused ignition. Human uses which create ignition risk include residential, industrial (light manufacturing, timber harvest, mining/quarry operations), recreational, tourist and travel activities. Human use within the watershed is high. The human caused fire occurrence pattern for the watershed would generally be a fire starting on private lands at low elevations and burning onto BLM lands reaching the uppermost ridgetops.

Lightning occurrence in the watershed has been high. The watershed typically experiences at least one lightning storm event each summer. Multiple fire starts often result from these storms.

The potential for a large fire is high to extremely high for the Grants Pass Watershed. This is due to the buildup of fuels, both live and dead, overstocking of conifers and hardwoods, the presence of less fire resistant species which have invaded in the absence of frequent fire occurrence, and past management practices that created but did not treat slash.

L. UNIQUE SPECIES AND HABITATS

1. Terrestrial Habitats

a. Special Status Plants

Approximately 3,328 acres of BLM lands within the Grants Pass Watershed have been surveyed to date (April 1996) for special status vascular plants. This constitutes 27% of BLM lands, the majority being in the Matrix land allocation. Surveys have been completed in conjunction with the Savage Green (FY97), Bloody Jones (FY97) and Berlin Mummer (FY98) timber sales along with some silviculture treatment units.

A total of 27 special status vascular plant sites have been located from the survey work. Species found include: *Cypripedium fasciculatum*, *C. montanum*, *Plagiobothrys figuratus ssp. corallicarpus*, *Carex livida*, *Rosa spithamea var. spithamea* and *Sidalcea malvaeflora ssp. asprella*.

This wide variety of species is due to the diversity of habitat in this watershed. BLM lands in this watershed contain intact valley habitat such as wet meadows, shrub lands and oak woodlands, late- successional mixed evergreen habitats. The wet meadows especially harbor high species diversity. The rare species found in this type of habitat, such as *Plagiobothrys figuratus ssp. corallicarpus*, are essentially rare because of encroachment by urban development.

b. Wildlife

The threatened northern spotted owl (*Strix occidentalis caurina*) is the only known listed animal in the Grants Pass Watershed. There is no U.S. Fish and Wild Service (USFWS) designated spotted owl critical habitat in the watershed, but there are eight established 100-acre core areas in the watershed. These areas are managed as Late-Successional Reserves (NFP-ROD, RMP-ROD).

Key processes for wildlife include dispersal and migration of wildlife within and through the watershed. This process is highly dependent on quality, quantity and spatial distribution of appropriate habitat through time. Species habitat requirements vary greatly and a single dominate vegetative structure will not meet the needs of all species. Migration can occur at a localized level or at regional level. Species migrating through the watershed on a regional level include animals as diverse as insects, bats and birds. Localized migration allows for species to take advantage of foraging opportunities and cover during inclement conditions. Localized dispersal of species is critical for insuring gene flow and repopulation of uncolonized habitat.

The high diversity of soil types and consequent vegetative communities and habitats in the Grants Pass Watershed provides for the potential of a host of sensitive animal species. Relatively few formal surveys for wildlife have been conducted in the watershed. There is potential habitat for 46 vertebrate special status species (15 mammals, 19 birds, and 12 reptiles and amphibians). In addition, nine more sensitive invertebrates species are known to occur in the vicinity (see Chapter III, Current Condition, for a complete list of sensitive species). Distribution, abundance, and presence for the majority of the species is unknown. Other species of concern include cavity nesting species, band-tailed pigeons, and neotropical migrant birds. Twenty-one of these special status species are associated with older forest, eight with riparian, and eight with special habitats such as caves, cliffs and talus. The remaining species are associated with habitats such as oak stands, meadows and pine savannahs (see Chapter V, Synthesis and Interpretation, for habitat trends). The NFP-ROD has identified additional "Survey and Manage" wildlife species that probably occur in the watershed: two amphibians and one mammal (see Chapter III, Current Condition).

2. Aquatic Habitats

a. Fisheries

Cutthroat trout, steelhead, coho and chinook salmon are found in the Grants Pass Watershed. Each are a cold water species and require complex habitats especially in the early life stages. Quantitative abundance estimates are absent. A qualitative analysis depicts a low abundance of cutthroat and coho and low to moderate abundance for steelhead and chinook based on professional observations. Cutthroat trout and coho salmon can be considered an indicator species for the health of an aquatic ecosystem. Cutthroat and steelhead typically have a wider range of distribution and are found higher in the tributaries than coho and chinook. Factors limiting salmonid production in the Grants Pass Watershed include: 1) the lack of water during the end of a water year, 2) high water temperatures during summer months, 3) erosion/ sedimentation to streams, 4) lack of large woody material in the stream and riparian area, 5) lack of rearing and holding pools for juveniles and adults, respectively, 6) channelization of streams in the canyons and lowlands, and 7) blockages of migration corridors. These factors also impact non-salmonid fish, macroinvertebrates and other aquatic organisms and in many instances are attributable to adjacent land management practices (e.g., agricultural practices, irrigation withdrawals, urbanization).

The mainstem of the Rogue River flows through the Grants Pass Watershed. Anadromous fish such as the Pacific lamprey, salmonids including summer and winter steelhead, cutthroat trout, fall and spring chinook and coho salmon use the Rogue River for migration. Spring chinook spawn in the mainstem primarily above Gold Ray Dam. Fall chinook spawn in the mainstem primarily below Gold Ray. As summer water temperatures rise, disease rates in salmonids increase. Spring chinook, which remain in the wild section all summer, are particularly affected by disease.

The Savage Rapids Dam is located several miles east of Grants Pass on the Rogue River. It was built in 1921 by the Grants Pass Irrigation District to divert river water for irrigation. The original design lacked fish ladders, which were added several years later. Fish passage improvements were made up to 1981, yet the dam still impedes migrating fish headed both up and downstream. A 1994 Bureau of Reclamation

Planning Report/Draft Environmental Statement revealed dam removal would "increase salmon and steelhead escapement at the site by an estimated 22%."

Factors such as stream temperature, number and depths of pools, large woody material, stream meander, road/stream crossings and sedimentation are key to the survival of salmonids and can severely limit fish production. Rearing salmonids require a water temperature of 58°F for optimum survival condition. Stream temperature is dependent upon riparian area temperature and both are influenced by heat sinks such as nearby roads and open meadows. Most fluvial streams in the Rogue River basin are deficient in the numbers of pools. Pools provide depth for hiding cover and volume for rearing habitat. A goal for adequate pool to riffle ratio is 40:60 or 30:70 depending on the geomorpholgy of the watershed.

Coho salmon are considered at a moderate risk for extinction. Coho are listed as a federally-threatened species in the Rogue River basin. Steelhead are proposed as threatened or endangered in the Rogue River basin.

Table II-3 lists special status and federally-threatened aquatic species inhabiting the Grants Pass Watershed.

Table I-3: Special Status and Federally-Threatened Fish Species

Species	**Status**
Steelhead	BLM Special Status Species. National Marine Fisheries Service proposed candidate status for wild steelhead in southern Oregon and northern California (May 1995).
Coho salmon	All coastal stocks south of Cape Blanco and north of Punta Gorda are threatened (Federal), (June 1997). American Fisheries Society "at risk" (Nelsen *et al.*, 1991) State of Oregon sensitive (ODFW 1992)
Cutthroat trout	Status review by NMFS
Pacific lamprey	Federal category 2 (USDI 1994)

M. HUMAN USES

The land ownership pattern of the Grants Pass Watershed was molded in the late 1800's and early 1900's. The lands in the watershed in the mid 1800's were public lands owned by the United States and administered by the General Land Office. The first large scale transfer of public lands from federal ownership was to the State of Oregon following statehood in 1859.

In order to further develop the West, Congress passed several laws enabling settlers to develop and obtain ownership of the public lands. These included Donation Land Claim patents, entry under the Homestead Acts, military patents and mineral patents. In addition to these types of deeds, land was deeded to the Oregon and California Railroad (O&C), with some of those lands being sold to private individuals. In reviewing the master title plats for the Grants Pass Watershed, it is apparent that ownership of several of the low elevation lands were originally deeded from the United States to private individuals through the above Acts of Congress.

Current human use of the watershed includes tourism, agriculture, recreation, timber production and harvesting (primarily in the east half of the watershed). The City of Grants Pass is located in the center of the watershed, and the City of Rogue River borders the eastern edge of the watershed. Many rural residential areas are dispersed throughout the watershed.

Recreational use of the area includes fishing, boating, hiking, off-highway vehicle (OHV) use, hunting, mountain biking and equestrian use. Cathedral Hills Park, a R&PP lease, is located south of Grants Pass and is leased to Josephine County. Hiking, mountain biking and horseback riding occur throughout the 400-acre park. Highland Park (named by the City of Grants Pass) is located immediately adjacent to the urban growth boundary of Grants Pass. This is a 40-acre parcel which was leased to the city in 1966. The lease, however, expired in 1991. There is a hiking trail that begins on this BLM parcel and continues to private land. The Rogue River passes through the watershed and provides recreational opportunities. The river above Savage Rapids Dam provides opportunities for water skiing, jet skiing, fishing, and swimming, while below the dam, jet boats and rafts use the river with Grants Pass being a hub for jet boat activity. There are also many non-designated trails and footpaths in the area.

N. REGULATORY CONSIDERATIONS

Important federal laws pertinent to management of the federal lands in the watershed include: National Environmental Policy Act (NEPA), Federal Land Policy and Management Act (FLPMA), the National Historic Preservation Act (NHPA), Endangered Species Act (ESA), 1872 Mining Law, Clean Water Act (CWA), Clean Air Act (CAA), National Wild and Scenic Rivers Act, and the Oregon and California Lands Act (O&C Act).

II. KEY ISSUES

The purpose of this section is to focus the analysis on the key elements of the ecosystem that are most relevant to the management questions, human values, or resource conditions within the watershed (*Federal Guide for Watershed Analysis, Version 2.2,* 1995).

Key Issues are identified in order to focus the analysis on the unique elements of the watershed. Key issues are addressed throughout the watershed analysis process within the context of the related core questions. (*Federal Guide for Watershed Analysis*, p. 12-14). Key issues identified are summarized in Table II-1. A short narrative follows discussing the relevance of each key issue in the watershed. Issues are not listed in any order of relative importance.

Table II-1: Key Issues

Key Issue	Related Core Topic
The watershed encompasses a large rural interface area and a great deal of private property, much of which is within the City of Grants Pass' Urban Growth Boundary.	Human Uses, Hydrology, Vegetation, Fire, Erosion process, Species and Habitats.
There are high road densities both within the urban/rural interface areas and the wildlands/forested areas.	Human Uses, Hydrology, Erosion Processes, Species and Habitat
Road drainage culverts on BLM-administered lands are frequently undersized, deteriorating, and block fish passage.	Human Uses, Stream Channel, Species and Habitat
Excess sediment in streams.	Human Uses, Hydrology, Erosion Processes, Species and Habitat
Occurrence of sensitive species	Species and Habitat
Fire exclusion and human development have created conditions with high potential for severe wildfires.	Human Uses, Species and Habitat

A. RURAL INTERFACE AND CITY OF GRANTS PASS URBAN GROWTH BOUNDARY

The rural interface area (RIA) and future urban growth has the potential of being a critical element affecting future management of the ecosystem within the watershed. Increased urbanization historically has been extremely influential in altering physical, biological, and human processes. The process of urban growth is a political and social issue concerned with land use allocations and social values. These have historically changed over time. Society in general places a high value on open space and natural vegetation landscapes. Currently, urban growth is legally regulated through land use allocations and planned development. Federal ownership and land management direction retains 23% of the watershed in natural resource management land use. Development is most common near cities and towns. However, relatively rapid increases have occurred on privately owned non-commercial forest lands. These lands are typically valley bottoms in the numerous subdrainages located throughout the Grants Pass Watershed. These lands have increasingly been sub-divided into smaller sized parcels allowing population densities to increase.

Urban growth into valley habitat has fragmented habitat integrally tied to the existence of some special status plant species. The valley habitat in which the City of Grants Pass is situated has been heavily developed as true in most of the Rogue Valley. This development continues to spread into foothill oak woodland habitat. Besides developing over this habitat, domestic water use could also be lowering water tables indirectly affecting wetland plant diversity. Off-road vehicle use or illegal dumping could be disturbing individual populations and introducing exotic species.

Urban growth may potentially affect sensitive plant and animal populations through displacement of individuals, eradicating populations and alteration of habitats. Converting natural vegetation into urban landscapes or agricultural uses reduces diversity and introduces exotic species. Increased urban growth further stresses aquatic systems which are already suffering from over appropriation. Stresses include decreased water quality, reduction in streamside vegetation, increased water temperatures and unnaturally high levels of sedimentation from urban runoff.

The urban growth and rural interface issue may affect management of the human uses in the watershed. The following sub-issues were identified relating to human uses:

> *Visuals:* Due to the proximity of the public lands within the viewshed of the City of Grants Pass, Interstate 5, and the Rogue River, land management activities on the adjacent public lands may be visible.
>
> *Unauthorized uses:* The public lands adjacent to the large population area in, and around, Grants Pass and Rogue River increases the potential for unauthorized uses of the public lands within the watershed. These uses include dumping, theft of special forest products, off-road vehicle use which may damage natural resources, and vandalism of government property.
>
> *Recreation:* Recreational opportunities exist on the public lands within the rural interface areas adjacent to the City of Grants Pass. There is a high demand for recreational use of these areas.
>
> *Adjacent public lands:* As the population of the urban area increases the management of the public lands will be more closely influenced. This influence may be reflected in the development of the future land use plans for the public lands.
>
> *Communication sites:* There is a high demand for the future development of the public lands within the viewshed of the City of Grants Pass and the City of Rogue River for communication sites. This type of development may conflict with the other high elevation uses of these types of lands.
>
> *Encroachment:* With the increase in population adjacent to the public lands within the watershed, there is an increased chance of encroachment onto those public lands. This encroachment may include the need for access across or special use of BLM-managed lands for adjacent private

landowner needs.

Road density: Because of the expanding growth of the urban area, the high density of roads on private lands will continue to increase the overall road density within the watershed.

River use: The City of Grants Pass is the center of many recreational uses of the Rogue River, i.e., tour boats, fishing trips, rafting trips, etc.

B. HIGH ROAD DENSITIES

There are high road densities throughout much of the Grants Pass Watershed. This relates to soil erosion, water quality and quantity issues. Roads concentrate surface and shallow groundwater and routes it to natural drainage ways. High road densities can also have numerous adverse impacts on fish and wildlife. Roads lead to increased vehicular/human disturbances, serve as access for poaching and fragment areas of wildlife habitat.

C. UNDERSIZED DRAINAGE PIPES ON BLM ROADS

Culvert installation prior to 1992 were designed to accommodate a 25 to 50 year flood event or sized based on channel width and stream flow. Today's culvert design standards are that they accommodate a 100-year flood event. During road inventories existing culverts are evaluated for future replacement to meet a 100 flood event.

D. SEDIMENT IN STREAMS

Given that the Grants Pass Watershed is highly developed in terms of roads, construction, agriculture, and forestry and that highly-erodible soils, such as granitic soils, are common sediment found in streams at greater than background (natural) levels. This sediment alters macroinvertebrate habitat and reduces fish spawning substrate quality, thereby reduces fish distribution.

E. SENSITIVE SPECIES

Due to the wide diversity of habitat in the Grants Pass Watershed, numerous special status species have been located. The primary factor affecting these species is habitat quality and quantity. The Endangered Species Act (ESA), the Northwest Forest Plan and BLM guidelines outline the federal responsibilities regarding the management of special status species.

Serpentine-influenced and non-serpentine meadows in the Grants Pass Watershed are being encroached upon by surrounding trees and shrubs and invaded by exotic annual grasses. These openings provide habitat for the species, *Plagiobothyrus figuratus ssp. corallicarpus* and *Carex livida*. The surrounding

trees and shrubs as well as exotic grasses appear to be filling in these openings, reducing potential habitat for these special status species.

F. FUELS AND FIRE

There is a high level of risk for a large, high-severity wildfire within the watershed. Mixed land ownership, rural interface areas, and proximity to population centers increase the complexities of fire protection, fuels management and hazard reduction programs.

Fire exclusion and human development has created vegetation and fuel conditions with high potential for large, destructive, and difficult to suppress wildfire occurrence. The watershed has a large amount of high values at risk of destruction and loss from wildfire. High severity, stand replacement wildfire presents a threat to human life, property, and nearly all resource values within the watershed. Management activities can reduce the potential for stand replacement type fires through hazard reduction treatments. Public acceptance of hazard reduction management activities will be critical for the long-term health and stability of the forest ecosystem within the watershed.

III. CURRENT CONDITION

A. PURPOSE

The purpose of current condition is to develop detailed information relevant to the key issues from step 2, and to document the current range, distribution, and condition of the core topics and other relevant ecosystem elements.

B. CLIMATE

The Grants Pass Watershed has a Mediterranean climate with cool, wet winters and warm dry summers. Average annual precipitation in the watershed ranges from approximately 28 inches in the east end of the watershed to 36 inches in the west side of the watershed. Most of the precipitation is in the form of rain with less than 5% of the watershed located within the transient snow zone (TSZ), roughly above 3,000 feet in elevation, where snow and rain both commonly occur.

There is one NOAA weather station located about nine miles to the north of the watershed at the summit of Sexton Mountain, 3,836 feet elevation. Data from this station has not been collected since 1992. The 30-year average (1951 through 1980) rainfall at Sexton Mountain is 38.14 inches. The average monthly air temperatures at Sexton Summit Weather Station are shown in Figure 3. The Grants Pass NOAA Weather Station located at an elevation of 925 feet. The 30-year average (1951-1980) rainfall at the Grants Pass Weather Station is 31.01 inches. The average monthly air temperatures at the Grants Pass Weather Station are shown in Figure 2.

Figure 1: Average Monthly Rainfall

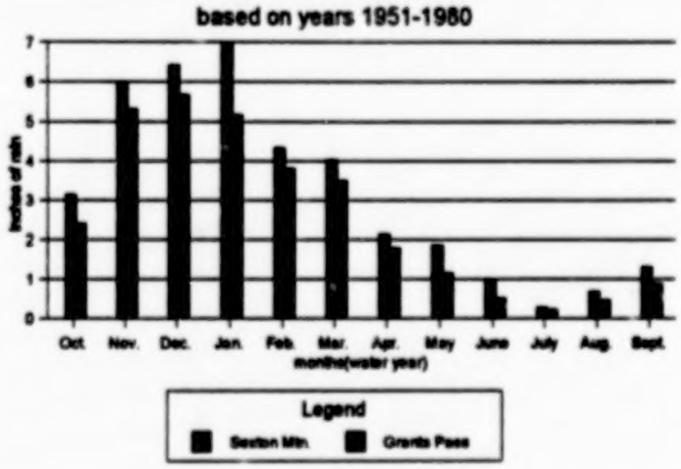
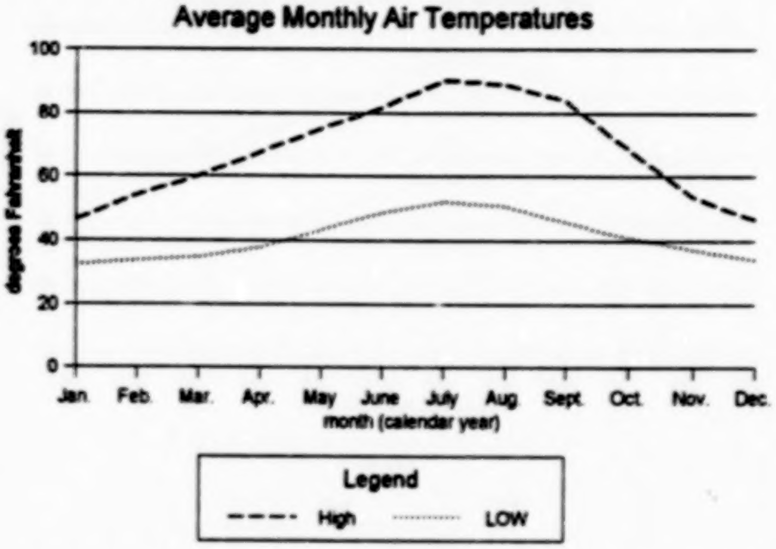
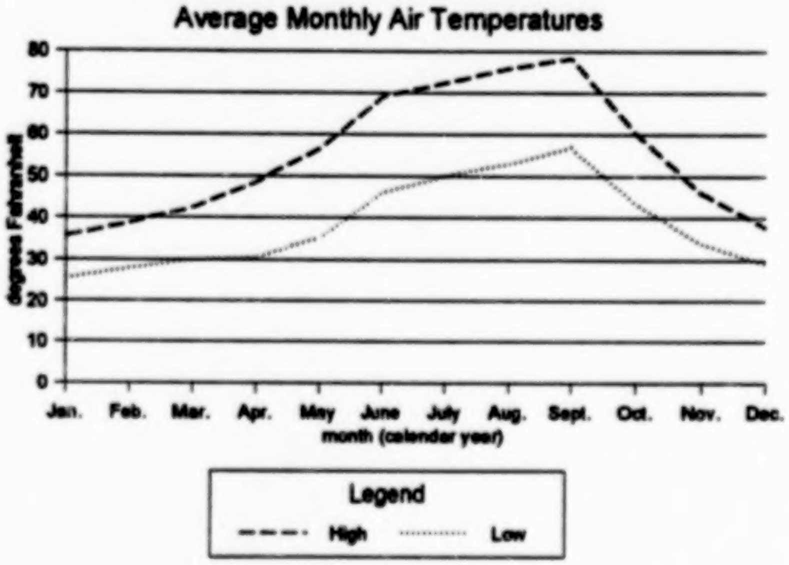

based on years 1951-1980

Figure 2: Grants Pass Weather Station



Source: NOAA (Medford Office)

Figure 3: Sexton Summit Weather Station



Source: NOAA (Medford Office)

C. EROSION PROCESSES

"Erosion hazard" is an indication of a soil's susceptibility to particle or mass movement from its original location. Particle erosion hazard, concentrated flow assumes a bare soil surface condition. If the soil is protected by vegetation, litter and duff, such that no mineral soil is exposed, concentrated flow erosion is not likely to occur and mass movement or streambank erosion is less likely to occur. Map 20 shows general soils in the Grants Pass Watershed. It is based on the more detailed *Soil Survey of Josephine County, Oregon* (USDA 1983). The steeper sloping soils on hillsides, mountainsides, and ridges have a high erosion hazard. Of these, granitic soils (general soil unit 10) have especially high or very high erosion hazard (see below).

The dominant erosion process is concentrated flow erosion: gully, rill, and sheet. This form of erosion occurs when water accumulates on the soil surface predominately where there is little or no protective organic material. As the water flows downslope it builds energy which allows for detachment of soil particles that then travel as sediment in the flowing water. The sediment is then deposited where flow rates diminish.

Areas that are particularly susceptible to concentrated flow erosion include:

1. Steep granitic soils

Siskiyou series (USDA 1983). These soils have low cohesion and tend to erode very easily when subject to concentrated flow. Siskiyou soil usually has thin surface duff layers that serve to protect the mineral soil (Siskiyou-Tethrick, Map 20). "Steep Granitic" Siskiyou Soils (USDA 1983) were developed from quartz diorite of the Grants Pass pluton (OR-DOGAMI 1979). These soils are very highly erosive where there is no cover for protection. Siskiyou soils are also vulnerable to concentrated flow erosion because natural duff and litter cover is usually minimal, less than an inch. Also, the surface soil (top soil) is very thin and can be easily lost, leaving soil of minimal fertility with a poor ability to support regenerating vegetation.

These soils occur in mixed ownership in the watershed. Some observation around Granite Hill at the south central edge of the watershed indicates soil losses due to erosion have been significant. Deep gullies on steep slopes near Interstate 5 appear to be caused by motorcycle use.

2. Steep Soils Derived from Other Minerals in the Watershed

These soils have high erosion hazard due to the severity of the slope. The steep slopes give flowing water high erosive energy as it builds up speed running downslope (see Map 20, Vannoy-Manita-Voorhies, Beekman-Vernisa-Colestine, Pearsoll-Dubakella-Eightlar, Cornutt-Dubakella).

Conditions that are most conducive to concentrated flow erosion include road drainage outlets, unprotected road ditches, areas of bare soil usually created by ground disturbing activities or fire, wheel ruts on natural surface roads, and highly-altered ground surface created by OHV's or other motorized equipment. Areas of high road density, which allow for more intense ground disturbance than would naturally occur, are usually indicative of this type of erosion.

Another process that occurs commonly in the watershed is streambank erosion. This is the loss of streambanks through sloughing, block failure, or scouring by high stream flows. Streambank erosion occurs as a result of increased stream peak flow combined with exposed deep, fine textured soil and/or poorly drained soils that make up the banks. Map 20 (Map units: Clawson-Jerome, Pollard-Abegg, Brockman, Holland-Barron-Siskiyou) shows areas of soils with deep, fine texture or poorly drained that are most susceptible to streambank erosion The watershed experienced a 20 to 30 year storm event in January, 1997.

Conditions generally worsen where new roads continue to be constructed and OHV activity continues. If roads are constructed with natural surface on side slopes with no seasonal control of wet season use, the problem is particularly pronounced (Road Density section below).

3. High Road Densities

Roads on sloping ground intercept surface water and shallow groundwater. The water is commonly routed by the road to a draw or other natural drainage way that is part of the natural stream system. This process causes drainage water to reach streams quicker than would naturally occur. The more roads that exist in a particular area, the more the increase of peak stream flow is. With an increase of peak stream flow, streambanks are more susceptible to erode as the stream channel adjusts to the change in flow pattern. Additional stream sediment caused by this phenomenon predominately comes from eroded streambanks. Other sources for stream sediment are the road surface and eroded channels created by flows at drainage outlets downslope.

The above gives the general perspective on high road densities, however, road design and locations of the landscape produce varying effects. For example, an out-sloped road with waterdips and a rocked surface would produce less effects than a lower slope natural surfaced road with ditches. This is because of differences in proximity to the stream system, degree of concentration/distribution of surface water flow due to road design, and differences in amount of protection of the road surface. In order to understand the comprehensive nature of road effects in the Grants Pass Watershed a full analysis of all subwatersheds is needed of road densities and existing road conditions, design, and location on the landscape.

D. HYDROGRAPHY

There are approximately 379 miles of streams in the Grants Pass Watershed. Table III-1 indicates mileage by stream order (see also Map 6).

Table III-1: Miles of Stream by Stream Order

Stream Order							
1	2	3	4	5	6	7	Total
122	151	73	22	10	1		379

Source: Medford BLM GIS

Stream orders are defined by how many streams come together to create a larger stream. A stream that is at the headwaters and has no tributaries is a first order stream. When two first order streams flow together at the point that they join the stream becomes a second order stream. When two streams of the same order join, the stream order increases by one.

First and second order streams in the watershed have a major influence on downstream water quality since they comprise approximately 72% of the total stream miles. Beneficial uses supported by these streams include aquatic species and wildlife. Most first and second order streams in the watershed are characterized by intermittent stream flow, which are generally very narrow and V-shaped with steep gradients. Large woody debris, which dissipates stream energy and slows channel erosion, is a key component of these headwater streams. The amount of large woody debris in first and second order streams in the planning area has been greatly reduced as a result of harvest and prescribed burning. This loss of woody debris contributes to reduced channel stability and increased sediment movement downstream during storm events (USDI-BLM 1994). In highly-populated areas such as commonly occur in the Grants Pass Watershed, it is also common for large wood to be removed in order to reduce unplanned obstructions to flow that may cause damage to developed land.

Third and fourth order streams comprise 27% of the stream miles in the watershed. Many of these streams support fish or directly contribute to the water quality of fish-bearing streams. Third and fourth order streams in the watershed are generally perennial, fairly narrow, have stream gradients less than 5%, and have U-shaped channels. During winter storms, these streams can move large amounts of sediment, nutrients and woody material. Channel condition of these streams varies and depends upon the inherent channel stability and past management practices in the watershed. The amount of large woody debris contributed to these streams has been reduced by past management practices in the riparian areas (USDI-BLM 1994).

Fifth order and larger streams make up 2.5% of the stream miles in the planning area. These streams support fish as well as other beneficial uses. Fifth order and larger streams tend to be wider, have flatter gradients and a noticeable floodplain. Flood events play a major role in the channel condition of these larger streams. Actions on adjacent upland areas and on non-BLM-administered land have adversely affected some of these stream segments (USDI-BLM 1994).

Mature stands of trees along all streams on BLM-administered land generally contain trees of sufficient size to provide a future source of large woody debris. Past practices such as salvage logging from stream channels, leaving few conifers in riparian areas and removing debris jams to improve fish passage have, however, reduced the amount of large woody debris in fifth order and larger streams (USDI- BLM 1994).

E. HYDROLOGY

1. Water Quality

a. Section 303(d) Streams

Water quality varies greatly throughout the Grants Pass Watershed. The Oregon Department of Water Quality has monitored and/or collected water quality data from various sources on the streams and water bodies of the state. This information is captured in DEQ's 1988 Oregon Statewide Assessment of Non-Point Sources of Water Pollution and has been periodically updated and compared to standards. This has lead to listing of some streams as "Water Quality Limited." The most recent stage of this process has been the publication for public review of Oregon's 1998 Section 303(d) Decision Matrix by the Oregon DEQ. Medford BLM has performed very limited amounts of water quality testing, principally temperature, in the Grants Pass Watershed.

Table III-3 was created from data from the DEQ's 1998 303(d) Draft List Decision Matrix.

Table III-2: 303(d) Listing Data for Streams in the Watershed

Stream & Segment	Parameter / Criteria	Basis for Consideration	Supporting Data or Info	Listing Status
Rogue River, Applegate to Evans Creek	Bacteria - Summer Water contact rec.	DEQ data (1988)	DEQ data (1986-1996)	303(d)
	Aquatic weeds or algae	NPS assessment, observation	none	need data
	Flow modification	NPS assessment, data (DEQ, 1988)	none	need data
	Nutrients	NPS assessment, data (DEQ, 1988)	none	need data
	Sedimentation	USGS data; NPS assessment, data (DEQ, 1988)	none	need data
	Temperature (Fish rearing, 64°F)		USGS data exceeded std. 12-63 days, 1990 thru 1994	303(d)
Bee Creek, Savage Creek to Headwaters	Temp. (Fish rearing, 64°F)	BLM data	BLM data exceeded standard 1997	303(d)

Table III-2: 303(d) Listing Data for Streams in the Watershed				
Stream & Segment	**Parameter / Criteria**	**Basis for Consideration**	**Supporting Data or Info**	**Listing Status**
Fruitdale Creek	Flow modification	NPS assessment, observation (DEQ, 1988)	none	need data
	Sedimentation	NPS assessment, observation (DEQ, 1988)	none	need data
	Temperature	NPS assessment, observation (DEQ, 1988)	none	need data
Jones Creek	Flow modification	NPS assessment, observation (DEQ, 1988)	none	need data
	Sedimentation	NPS assessment observation (DEQ, 1988)	none	need data
Vannoy Creek	Flow modification	NPS assessment, observation (DEQ, 1988)	none	need data
	Nutrients	NPS assessment, observation (DEQ, 1988)	none	need data
	Sedimentation	NPS assessment, observation (DEQ, 1988)	none	need data
	Temperature	NPS assessment, observation (DEQ, 1988)	none	need data
	Toxics	NPS assessment, observation (DEQ, 1988)	none	need data

All streams noted above as making the 303(d) status are considered water quality limited. They will be required to be managed under Water Quality Management Plans. Other streams with status of "Need Data" are candidates for Water Quality Limited status but, due to insufficient data, that conclusion was not possible when the list was made. Future data collection may change status.

The section of the Rogue River upstream from the Grants Pass Watershed is on the 303(d) list only for temperature.

2. Water Temperature

Many factors contribute to elevated stream temperatures in the Grants Pass Watershed. Low summer stream flows, hot summer air temperatures, low gradient valley bottoms, lack of riparian vegetation, and high channel width-to-depth ratios result in stream temperatures that can stress aquatic life. Natural disturbances that can affect stream temperature are climate (e.g., high air temperatures), below normal precipitation (low flows), wildfire (loss of riparian vegetation), and floods (loss of riparian vegetation). Human disturbances affecting stream temperatures include water withdrawals, channel alterations and removal of riparian vegetation through logging, grazing, agricultural or residential clearing (USDI-BLM 1997).

The DEQ has established that the seven (7) day moving average of the daily maximum shall not exceed the following values unless specifically allowed under a department-approved basin surface water temperature management plan:

- 64° F
- 55° F during times and in waters that support salmon spawning, egg incubation and fry emergence from the egg and from the gravels.

The BLM and other agencies monitored stream temperatures in the Grants Pass Watershed during the summer of 1997 and other listed summers.

a. Stream Flow

The stream flow in the Grants Pass Watershed fluctuates with the seasonal variation in rainfall for tributary streams, the Rogue River also fluctuates with upstream variation caused by releases at Lost Creek Dam and input from upstream tributaries to the Rogue. There are high flows in the winter and early spring and very low flows in late summer and early autumn.

(1) Peak Flow

Maximum peak flows generally occur in December, January and February with some localized peak flows occurring on small tributary streams occasionally in spring or summer due to thunderstorms. Records are available for the Rogue River at Grants Pass for 1939 to 1993 (USGS Open File Report, 93-63). The maximum discharge for the period of record was 152,000 cfs on December 23, 1964. The maximum recorded stream flow on the Rogue since Lost Creek Dam was constructed was 85,600 cfs on January 1, 1997. If the Rogue River had not been regulated flow would have been approximately 109,000 cfs (U.S. Army Corps of Engineers data and computations).

Upland disturbances can result in increased magnitude and frequency of peak flows which may result in accelerated streambank erosion, scouring and deposition of streambeds, and increased sediment transport. The natural disturbance having the greatest potential to increase the size and frequency of peak flows is a severe extensive wildfire. In the Grants Pass Watershed the primary human disturbances that can potentially affect the timing and magnitude of peak flows include urban development, roads, soil compaction and vegetation removal (forest product harvest and conversion of sites to agricultural use). Quantification of these affects on stream flow in the Grants Pass Watershed is unknown, however, the greatest affect of increasing peak flows would be on tributary streams. Roads quickly intercept and transport subsurface water and surface water to streams. The road altered hydrologic network may increase the magnitude of increased flows and alter the timing when runoff enters a stream (causing increased peak flows and reduced low flows). This effect is more pronounced in areas with high road densities and where roads and other compacted, high runoff surfaces are in close proximity to streams (USDI-BLM 1997).
Soil compaction resulting from logging yarding corridors, agriculture, grazing, and urban development also affects the hydrologic efficiency within a watershed by reducing infiltration rates and causing more rainfall to quickly become surface runoff instead of moving slowly through the soil to stream channels (USDI-BLM 1997).

Vegetation removal reduces water interception and transpiration and allows more precipitation to reach the soil surface and drain into streams or become groundwater. Until canopy closures reach previous levels, it is considered to be hydrologically unrecovered. Rates of hydrologic recovery are site specific and depend on many factors including the type and extent of disturbance, soils, climate and rates of revegetation (USDI-BLM 1993). Much of the Grants Pass Watershed has altered vegetation that will not recover to natural canopy closure conditions simply because agricultural and urban use have precluded natural vegetation patterns.

The transient snow zone (TSZ) is the zone in which rain on snow will commonly fall. This is a moderate elevation that is between the common snow level and where rain is the usual form of precipitation. In the Grants Pass Watershed runoff from rain on snow in openings is not significant enough to create excessive runoff and thus high stream flows. This is because the area of openings does not appear to be large in relation to the subwatershed area. Very little of the watershed area is within the elevation band of the TSZ: approximately 3,000 to 4,500 feet.

(2) Low Flow

Low summer flows in the Grants Pass Watershed reflect the low summer rainfall. Naturally low summer flows are exacerbated by periods of below normal rainfall. Many tributary streams often dry up during years of below normal precipitation. The greatest human need for water occurs during the summer months when demand for irrigation and recreation uses is highest (USDI 1997).

The Oregon Water Resources Department (ORWD) has determined that:

> "The maximum economic development of this state, the attainment of the highest and the best use of the waters of the Middle Rogue River Basin and the attainment of an

> integrated and coordinated program for the benefit of the state as a whole will be furthered through utilization of the aforementioned waters only for domestic, livestock, municipal, irrigation, agricultural use, power development, industrial, mining, recreation, wildlife and fish life uses and the waters of the Middle Rogue River are hereby so classified with the following exceptions:"
>
> "The waters of the following streams and tributaries, are classified only for domestic use, livestock consumption and instream use for recreation, fish life and wildlife except for the use of stored water. Water stored between November 1 and March 31 of any year may be used for any purpose specified in Section A. Domestic use does not include irrigation of lawns and gardens." Included in the list are the following streams in the Grants Pass Watershed: Fruitdale Creek, Gilbert Creek, Jones Creek and Savage Creek.

Since the Rogue River is regulated down stream from the Lost Creek Dam, low flows are more a function of regulation. In most years regulation of the river is generally based on fish and irrigation needs.

Table III-3 contains established minimum perennial stream flows for the Rogue River at Savage Rapids Dam and Fruitdale Creek at the mouth. This was established by the Rogue River Basin Program (ORWD 1989).

Table III-3: Minimum Perennial Stream Flow (cfs)

	Oct	Nov	Dec	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep
Rogue	1200	1200	1200	1200	1200	1200	1200	1200	1200	1200	200	1200
Fruitdale	4	4	4	4	4	4	4	2	1	1	1	1/5

(a) Groundwater

According to a field study performed by the Oregon Department of Water Resources (1988 to 1992), the Grants Pass Watershed is underlain by metamorphosed volcanic and sedimentary rock, small amounts of ophiolitic-complex rock, and rock of the granitic Grants Pass pluton. Narrow bands of alluvial sand and gravel mantle the bedrock along the stream drainages. The alluvial sediments are only locally saturated with groundwater and commonly do not constitute an aquifer. Thick alluvial terrace deposits are found along the Rogue River (also only locally saturated). Groundwater in the bedrock is contained within fractures in the rock. The fractures can be highly variable in distribution and typically supply only domestic quantities of water to wells. Where mapped, the groundwater surface mimics local topography, suggesting that recharge to and discharge from the groundwater system is localized. Water depth ranged from 50 feet to 500 feet. Wells in the granitic pluton tended to have a maintained a water level significantly higher than the level where water was first found. This appeared to be due to the highly weather grus overlying the hard fractured granite. It acted like a sponge drawing the water up and holding it 15 feet to 25 feet higher.

As part of the same study, a few water quality parameters were checked. Some high levels of Total

Dissolved Solids (TDS) were found, generally in wells placed in alluvial gravels near streams. This was due to shallowness of the underlying deep groundwater and resulting upwelling of the deep groundwater. One indicator of this was a well in the Fruitdale area that tested with 10,000 parts per million of chlorides, the maximum standard for drinking water in 250 ppm. Some other pollutants that were found sporadically were nitrates and volatile organic compounds (pers. comm., D. Woodcock, June 29, 1998).

Baseline information to assess the current status of groundwater quantity or quality is not available. Recent years of below normal precipitation have resulted in reduced recharge of groundwater supplies. Groundwater uses exempt from water rights include: stock watering, lawn or non-commercial garden watering of no more than 0.5 acres, and single or group domestic purposes for no more than 15,000 gallons per day. No information is available regarding the amount of exempt uses (USDI-BLM 1997).

F. STREAM CHANNEL

A system of stream classification has been developed by Rosgen that is useful in interpreting various types of streams as to their sensitivity to disturbance and their recovery potential. The streams are classified by letter from A to G. The first letter determines the stream reach type, the number represents the channel material and the small case letter refers to the slope of the reach. Tables III-4 and III-5 provide a description of these stream classifications.

Table III-4: Rosgen Stream Classification

Stream Type	General Description	Landform/Soils/Features
Aa+	Very steep (>10%), deeply entrenched, debris transport, torrent streams.	Very high relief. Erosional, bedrock of depositional features; debris flow potential. Deeply entrenched streams. Vertical steps with deep scour pools; waterfalls.
A	Steep (4-10%) entrenched, cascading, step/pool streams. High energy/debris transport associated with depositional soils. Very stable if bedrock or boulder dominated.	High relief. Erosional or depositional and bedrock forms. Entrenched and confined streams with cascading reaches. Frequently spaced, deep pools in associated step/pool bed morphology.
B	Moderately entrenched, moderate gradient, riffle dominated channel, with infrequently spaced pools. Very stable plan and profile. Stable banks.	Moderate relief, colluvial deposition, and/or structural. Moderate entrenchment and width/depth ratio. Narrow, gently sloping valleys. Rapids predominate w/scour pools.
C	Low gradient, meandering, point-bar, riffle/pool, alluvial channels with broad, well defined floodplains.	Broad valleys w/terraces, in association with floodplains, alluvial soils. Slightly entrenched with well-defined meandering channels. Riffle/pool bed morphology.
F	Entrenched meandering riffle/pool channel on low gradients with high width/depth ratio.	Entrenched in highly-weathered material. Gentle gradients, with a high width/depth ratio. Meandering, laterally unstable with high bank erosion rates. Riffle/pool morphology.

Table III-5: Rosgen Management Interpretations of Various Stream Types

Stream Type	Sensitivity to Disturbance	Recovery Potential	Sediment Supply	Streambank Erosion Potential	Vegetation Controlling Influence
A2	very low	excellent	very low	very low	negligible
A3	very high	very poor	very high	high	negligible
A4	extreme	very poor	very high	very high	negligible
B4	moderate	excellent	moderate	low	moderate
B5	moderate	excellent	moderate	moderate	moderate
B6	moderate	excellent	moderate	low	moderate
C3	moderate	good	moderate	moderate	very high
C4	very high	good	high	very high	very high
F5	very high	poor	very high	very high	moderate

In the Grants Pass Watershed preliminary site surveys were done and classification was determined from field data, topographic maps and photographs. Of the major streams, only four general stream classifications are present in the watershed: A, B, C and F (Rosgen, 1996). Information for Table III-6 was collected in two separate manners. For each reach *only one* field survey was done at one specific site within that reach. For example, in the Predominant Channel Material the information was gathered from only one specific site within that reach for that data. A representative site was chosen if possible. Sometimes, a site was chosen because it was the only accessible site (usually because of private property). The first percentage number for gradient was determined from a topographical map. The second number was determined at the specific site using a clinometer. The coarse woody debris was determined by an ocular estimate at the survey site standing at the site and looking up and down stream, approximately 50 yards in each direction.

Table III-6: Hydrologic Condition

Stream Name/ Reach	Stream Reach Length (Miles)	Predominant Channel Material (Site)	Average Gradient (Site)	Coarse Woody Debris (Site - Approx. 100 Yards)		Rosgen Stream Classification (Estimated)
				Instream	Riparian	
Bee Creek	0.9	gravel	5%	low	low	A4
Bloody Run Creek	1.0	bedrock	10%	none	low	A1
Greens Creek	1.1	gravel	8%	none	low	A4
Jones Creek	1.5	gravel	3%	none	none	B4
Jones, E. Fork Creek	0.8	cobble	6%	low	none	A3
Jones, W Fork Creek	1.9	cobble	7%	none	none	A3
Little Savage Creek, Upper	1.5	cobble	13%	low	mod	A3a+
Savage Creek, Lower	1.3	gravel	4%	low	high	B4
Savage Creek, Upper	1.6	gravel	6%	low	none	A4

There is a noticeable lack of coarse woody debris in the stream channels. Coarse woody debris in streams contributes to the form and structure of a stream's channel. The woody debris may cause a stream to widen and become narrow, to deepen and become shallow, and stabilize and become unstable at different points along the channel bed and banks. This diversity of channel form results in diversity of habitat for aquatic organisms. The coarse woody debris is particularly critical for the steep tributaries because it creates a stepped stream profile which dissipates stream energy. Large woody debris also traps and slows the movement of sediment and organic matter through the stream system (USDI-BLM 1997).

Substrate varies by the reach and stream throughout the Grants Pass Watershed. The information collected at specific stream sites is included in Table III-7. The lower elevation, low gradient stream reaches predominantly contain gravel, sand or silt. Sources of sediment in the Grants Pass Watershed, on BLM and other forest land, appear to primarily come from road surfaces, fill slopes and ditchlines. Soil that moves into the ditchlines is carried to stream systems by ditch runoff. Drainage areas with high numbers of road stream crossings are likely to experience the most sediment movement into stream channels. The high energy streams (types A and Aa+) are capable of transporting sediment to downstream reaches that support fish (USDI-BLM 1997).

Roads are adjacent to many of the stream reaches in rural and forested areas within the watershed. In addition to being a sediment source, these roads confine the stream channel and restrict the natural tendency of streams to move laterally. This can lead to down cutting of the streambed or erosion of the streambank opposite the road (USDI-BLM 1997).

The trend for channel stability and condition should improve with additional large wood recruitment over the long term. Roads will continue to supply sediment, although maintenance and decommissioning would reduce the sediment sources (USDI-BLM 1997).

Streams in intensive agricultural areas and urban/suburban areas (urban growth area) received a cursory review by BLM ((Grants Pass Resource Area, Soil/Water Program) in July 1996. Streams included in this are Fruitdale Creek, Allen Creek, Vannoy Creek, Gilbert Creek and Sand Creek. General comments that were commonly mentioned included: "Flow controlled by irrigation, warm temperatures (greater than 64°F), high amount embeddedness in substrate, highly-variable amounts of riparian vegetation, common structures (concrete and metal).

Undersized culverts can affect the stream channel by restricting stream flow. BLM design standards for culvert installation prior to 1992 in the Grants Pass Watershed was either to design for a 25 to 50 year flood event or size them based on channel width and stream flow. Today's culverts are designed for a 100-year flood event to meet the Northwest Forest Plan and the Medford District RMP requirements. During road inventories, existing culverts are evaluated for future replacement to meet the 100-year flood event.

G. VEGETATION

Data used to compile this section was collected in 1996. Maps 9, 10, 11 and 12 show the plant series and vegetation classification distribution.

1. Major Plant Series

Table III-7 summarizes the extent of the major plant series found in the Grants Pass Watershed.

Table III-7: Plant Series in the Watershed (1996)

Major Plant Series	Acres BLM	Percent	Acres Non-BLM	Percent	Acres All Lands	Percent
Non-vegetated	19	0.2%	9,508	23%	9,527	18%
Non- forest	122	1%	17,333	42%	17,455	33%
Douglas-fir	6,523	52%	5,205	13%	11,728	22%
Jeffrey Pine	97	1%	112	0.3%	209	0.4%
Pine other than Jeffrey	201	2%	470	1%	671	1%
Pine/Hardwood	164	1%	1,155	3%	1,319	2%
White Oak	3,445	27%	3,992	10%	7,437	14%
Douglas-fir/pine	1,968	16%	3,327	8%	5,295	10%
Totals	**12,539**		**41,102**		**53,641**	

3/26/98

2. Vegetation Classes

Table III-8 summarizes the dominant vegetation classes in the watershed.

Table III-8: Current Dominant Vegetation Condition Classes

Vegetation Condition Class	Acres BLM	Percent of BLM	Acres Non-BLM	Percent of Non-BLM	All Lands	Percent Total
Developed	0	0%	9,070	22%	9,070	17%
Non-vegetated	47	0%	438	1%	485	1%
Agriculture	0	0%	6,552	16%	6,552	12%
Grass	66	1%	0	0%	66	0.1%
Shrub	242	2%	157	0.4%	399	1%
Hardwood	2,813	22%	2,586	6%	5,399	10%
Hardwood/Conifer	5,768	46%	20,153	49%	25,921	48%
Pine	139	1%	112	0.3%	251	0.5%
Douglas-fir	3,464	28%	2,033	5%	5,497	10%
Totals	12,539		41,101		53,640	

* Dominant vegetation is grouped into classes that make up 50% or more of the surface area of a site. 5/26/98

Table III-9 summarizes the extent of the vegetation condition classes in the watershed.

Table III-9: Dominant Vegetation Condition Class

Vegetation Condition Class	Veg. Class	Acres BLM	Percent of BLM	Acres Non-BLM	Percent of non-BLM	Acres All Lands	Percent
Grass/Forb, Herbaceous vegetation	1	66	1%	0	0%	66	0%
Shrubs, non-forest land, usually natural shrub fields	2	166	1%	157	0%	323	1%
Hardwood dominated, includes non-forest and low site lands, could include commercial lands dominated with hardwoods.	3	4,412	35%	7,502	19%	11,914	23%
Early, 0-5 years stand age	4	151	1%	0	0%	151	0%
Seedling/Sapling, conifers >5 years and 1-4.9" DBH	5	124	1%	0	0%	124	0%

Table III-9: Dominant Vegetation Condition Class

Vegetation Condition Class	Veg. Class	Acres BLM	Percent of BLM	Acres Non-BLM	Percent of non-BLM	Acres All Lands	Percent
Poles (5 to 11")	6	2,164	17%	0	0%	2,164	4%
Large Poles (11 to 21")	7	3,565	28%	4,629	12%	8,194	16%
Mature (21" dbh +)	8	1,874	15%	0	0%	1,874	4%
Non-Vegetated, never vegetated or never will be.	9	47	0%	438	1%	485	1%
Developed/Vegetated, mix of development and vegetation.	10	0	0%	17,476	45%	17,476	34%
Developed/Non-Vegetated, was vegetated before development.	11	0	0%	8,743	22%	8,743	17%
Totals		12,569		38,945		51,514	

5/26/98

The above condition classes in themselves do not describe the structural characteristics of the vegetation and its degree of intactness (open vs. closed canopy, previously partial cut, never entered, etc.). Lumping the stands into one diameter range will often not permit us to assess the functional characteristics of the class for vegetative and habitat assessments. Natural stands in the Klamath province are rarely single size class, single storied stands. They are generally multi-aged, multi-storied stands that contain trees in a variety of different sizes. As an example, a size class 7 in a Douglas-fir stand on the southeast side of the watershed could be much different than a class 7 in a Ponderosa pine stand on the northwest side of the watershed. This is because the Ponderosa pine stand will naturally have much more open canopy. For these reasons, one additional descriptor, the McKelvey rating system, described in the Wildlife section, has been added which can provide additional information for the condition class.

3. Site Productivity

The plant series listed below were identified and mapped within the Grants Pass Watershed. Site productivity in terms of basal area per acre is described for each series. Basal area is defined as the area of the cross section of a tree stem near its base, generally at breast height, 4.5 feet above the ground and inclusive of bark (USDI-BLM 1994).

Douglas-fir	(*Pseudotsuga menziesii* ((Mirb.) Franco.))
Jeffrey Pine	(*Pinus jeffreyi* (Grev. & Balf.))
Ponderosa Pine	(*Pinus ponderosa* (Laws.))
White Fir	(*Abies concolor* ((Gord. & Glend.) Lindl.))
Western Hemlock	(*Tsuga heterophylla* (Raf.) Sarg.)
White Oak	((*Quercus garryana* (Dougl.))

The following basal area production rates are on a per acre basis. Basal area in a plant series is not limited to the tree species that series is named for. For example, basal area in the Douglas-fir series can be from Douglas-fir, madrone, sugar pine, or any other tree species present on the site. Basal area is used as a relative measure of site productivity. For example, an area that can support 200 feet of basal area is more productive than an area that can support 100 feet of basal area.

Douglas-fir is the most common tree species in southwestern Oregon. Sites within the Douglas-fir series average 254 square feet (Atzet and Wheeler 1984). Douglas-fir tends to produce conditions that favor fire wherever it occurs. This species is self-pruning, often sheds its needles and tends to increase the rate of fuel buildup and fuel drying (Atzet and Wheeler 1982).

The Jeffrey pine series is confined to areas of ultrabasic (serpentine and serpentine influenced) soils (Atzet and Wheeler 1982). Serpentine areas dominated by Jeffrey pine may have the lowest productivity of any conifer series in the Klamath Province with an average basal area per acre of 83 square feet (Atzet and Wheeler 1984). While not considered important in terms of timber production, these sites are floristically diverse supporting many special status plants. They also have value as unique habitats for a variety of wildlife species.

Forests in the Ponderosa pine series average approximately 170 square feet of basal area. This series is relatively rare as Ponderosa pine does not often play the role of a climax dominant (Atzet and Wheeler 1984). This series tends to occupy hot, dry aspects that burn frequently. Ponderosa pine regeneration is restricted by reducing the number of fire events. Due to the success of fire suppression over the last 70 years, overall cover of this series has decreased (Atzet and Wheeler 1982).

Western hemlock is present in isolated pockets in the Louse Creek drainage straddling the boundary between the Grants Pass and Jumpoff Joe Watersheds. This species grows in cool, moderate environments where moisture stress occurs late in the growing season (Atzet and McCrimmon 1990). Evapotranspirational demands are low. The average basal area for this series is 295 square feet. The fire regime is one of infrequent, high-intensity fires.

Sites in the white fir series are also considered productive with basal area averaging over 341 square feet (Atzet and Wheeler 1984). The white fir series is widespread, diverse and productive (Atzet and McCrimmon 1990). White fir's thin bark provides little insulation during low-intensity underburns until tree diameter reaches at least eight inches. Moreover, the tolerant nature of white fir which allows branches to survive close to the ground, makes the lower crown a ladder to the upper crown (Atzet and Wheeler 1982).

The white oak series occurs at low elevations and is characterized by shallow soils. Although Oregon white oak is usually considered a xeric species, it also commonly occurs in very moist locations - on flood plains, heavy clay soils, and on river terraces. On better sites, white oak is out competed by species that grow faster and taller (Stein 1990). Average basal area is 46 square feet. Water deficits significantly limit survival and growth (Atzet and McCrimmon 1990). White oak has the ability to survive as a climax species as it is able to survive in environments with low annual or seasonal precipitation, droughty soils, and where fire is a repeated natural occurrence (Stein 1990). Fire events in this series are high frequency and low intensity (Atzet and McCrimmon 1990). Due to the success of fire suppression over the last 70 years, the prominence of this series has declined.

The non-forest classification refers to areas that do not fit into one of the recognized natural plant series classifications, such as farmland, pasture land, orchards, and rural developed areas.

The non-vegetated classification refers to areas such as rock quarries, gravel storage sites, gravel streambeds, and bodies of water.

H. HUMAN USE

1. Socioeconomic Overview

Current human use of the watershed includes tourism, agriculture, recreation, and forest management. The City of Grants Pass, located in the center of the watershed, is the county seat for Josephine County, with services related to the county government and local business center. The City of Rogue River, located in western Jackson County, borders the eastern edge of the watershed. This creates a mix of urban and rural environments. Rural residential areas are dispersed throughout the watershed. The population within the watershed is increasing with a steady influx of new residents, especially with the urban expansion of Grants Pass.

The Grants Pass Watershed ranks third among watersheds in the Grants Pass Resource Area in the amount of private land in the rural interface area (RIA). There are 19,604 acres of private land (zoned in 1-5 acre lots and 6-20 acre lots) within one-half mile of BLM-administered land. The BLM manages 11,184 acres within one-half mile of private RIA land in this watershed. There are 7,071 acres of BLM-administered land within one-quarter mile of private RIA. This figure ranks highest for all watersheds in the Grants Pass Resource Area and third highest in the Medford District. (USDI-BLM 1994)

Interstate 5, a major north/south freeway, travels through the eastern third of the watershed. Cities within the watershed include Grants Pass and Rogue River. Business, industrial and residential development are centered in the Grants Pass area. Other residential development is located along Highway 99 between Rogue River and Grants Pass and along Highway 199 west of Grants Pass.

2. Recreation

a. Urban Recreation

City parks provide urban recreation opportunities in the watershed. City parks include Riverside, Baker, Westholm and Memorial Parks. These are day-use parks with a variety of facilities. Other recreation opportunities within the urban growth boundary of the city include all activities associated with a city atmosphere (sports activities such as softball, golf, basketball, volleyball, hiking and biking, etc.) .

b. River Recreation

The Rogue River runs through the watershed and is a main focus for recreation activities such as fishing, boating and swimming. County parks in the watershed are all located along the river and include: Schroeder, Tom Pierce, Pierce Riffle, Lathrop, Chinook and Tussing Parks. These parks have river access and a variety of other facilities. Hellgate Excursions, a major tourist attraction, provides jet boat river trips originating in Grants Pass. There is no federal land along the river in the watershed. The river above Savage Rapids Dam provides opportunities for water skiing, jet skiing, swimming and fishing.

c. Trails

There are two designated trail systems in the watershed. Cathedral Hills Park, a 400-acre parcel leased to Josephine County, provides approximately six miles of hiking, mountain biking and horse trails. Highland Park, an area formerly leased to the City of Grants Pass, is located adjacent to the urban growth boundary. This 40-acre BLM parcel is in a highly-populated area and has a one mile trail which begins on the BLM land, and continues onto private land, eventually reaching the top of Dollar Mountain.

d. Dispersed Recreation

Based on the federal land ownership, dispersed recreational use of the area is generally located in the east half of the watershed and includes off-highway vehicle use, hunting, mountain biking, equestrian use and driving for pleasure. There are no potential recreation sites listed in the Medford District RMP within the watershed.

3. Roads

Many roads in the Grants Pass Watershed have been constructed based on the public's need for access. The majority of these roads are on private lands. All midslope and low elevation natural surfaced roads are a potential source of erosion and sedimentation into streams. The BLM has no authority over private roads and private land use.

a. BLM Roads

Road construction and improvement across BLM-managed lands was based mainly on timber management as directed under Federal O&C land management. Many natural surfaced roads remained opened for administrative access after timber sales were completed. BLM roads are managed and inventoried through Transportation Management Objectives (TMOs) for potential decommissioning and/or improvements to help reduce sedimentation into neighboring streams.

b. Culverts

BLM culvert installation, prior to 1992, was designed for a 25 to 50 year flood event or sized based on channel width and stream flow. Today's newly-installed culverts are designed for a 100-year flood event to meet the Northwest Forest Plan and the Medford District RMP requirements. During road inventories, existing culverts are evaluated for future replacement to meet the 100-flood event.

c. Road Density

Road density and type of roads vary within the watershed. The average road density on BLM lands is 1.8 miles per square mile. The average road density outside of the urban growth boundary on other than BLM land is approximately 7.1 miles per square mile. The BLM continues to analyze and inventory BLM-controlled roads in an attempt to improve the roads and/or reduce road densities to a level appropriate for land management and the environment. Table III-10 shows the miles of road by surface type in the watershed.

Table III-10: Miles of Road by Surface Type

Surface Type	BLM Roads (Miles)	Non-BLM Roads* (Miles)
Natural (NAT)	30	
Pit Run Rock (PRR)	4	
Grid Rolled Rock (GRR)	1	
Aggregate Base Coarse (ABC)	0	
Aggregate Surface Coarse (ASC)	1	
Bituminous Surface Treatment (BST)	0	
Unknown/Various Types (UNK)	0	360
Total	**36**	**360**

* Outside of Grants Pass city limits 5/26/98

4. Minerals

a. Introduction

An inventory, utilizing the mining claim microfiche prepared by the BLM Oregon State Office, revealed that there are 21 mining claims currently existing within the watershed. There is a fairly even mix of lode claims and placer claims. There are also some millsite claims within the watershed.

On the lands administered by the BLM there are three levels of operations that may occur. The lowest level of operations is considered casual use. Casual use operations include those operations that usually result in only negligible disturbance. These types of operations usually involve no use of mechanized earthmoving equipment or explosives, and do not include residential occupancy. No administrative review of these types of operations is required. The number of casual users in this category are not known.

The most common level of operations involve activities above casual use and below a disturbance level of five acres. This level of operations requires the operator to file a mining notice pursuant to the BLM Surface Management Regulations. The mining notice informs the authorized officer of the level of operations that will occur, the type of existing disturbance at the location of the operations, the type of equipment to be used in the mining operations, and the reclamation plans following the completion of the mining activities.

Mining notices involve an administrative review of access routes used in the mining operations and a review to determine if unnecessary or undue degradation may occur as a result of the mining operations. No mining notices have been submitted for operations proposed to occur on the BLM-administered lands within the watershed.

A plan of operations may be required for mining operations that meet any of the following criteria:

(1) Proposed operations that may exceed the disturbance level of five acres;

(2) Activities above casual use in specially-designated areas such as Areas of Critical Environmental Concern, lands within an area designated as a Wild or Scenic River, and areas closed to off-highway vehicle use; and

(3) Activities that are proposed by an operator who, regardless of the level of operations, has been placed in non-compliance for causing unnecessary or undue degradation.

The review of plans of operations involves a NEPA environmental review to be completed no later than 90 days from the date of the submission of the plan. No plans of operations exist within the watershed at this time (August 1998).

In addition to federal laws mining claimants must comply with state laws where applicable:

(1) The State Department of Environmental Quality monitors and permits dredging activities and activities where settling ponds are used.

(2) The Department of Geology and Mineral Industries (DOGAMI) permits all activities over one acre in size and ensures reclamation is completed in a timely manner. DOGAMI requires reclamation bonds where applicable.

(3) The Department of State Lands permits instream activities where the removal, or displacement, of 50 cubic yards of material is anticipated and where the movement of a stream channel is planned.

(4) The Department of Fish and Wildlife (ODFW) monitors turbid discharges from mined sites. ODFW also recommends preferred dredging periods for operations within anadromous fish-bearing streams. ODFW also approves variances for operations outside the preferred work periods where applicable.

b. Surface Uses of a Mining Claim

In some instances the surface of the mining claim is managed by the claimant. These are usually claims that were filed before August, 1955 and determined valid at that time. The claimants in these cases have the same rights as outlined above, however, they have the right to eliminate public access across that area where they have surface rights. There are two instances within the watershed where the claimants have surface rights. These rights are outlined in Appendix B.

c. Mineral Potential

Mineral potential is defined in the Medford District RMP (Chapter 3, p. 102) as low, moderate or high (USDI-BLM 1994). The mineral potential maps (Map 21) show there is a moderate potential for chromite within the northeast portion of the watershed. There is a moderate potential for gold in the southeastern portion of the watershed. The remainder of the watershed has a low potential for minerals.

d. Current Physical Condition Resulting from Past Mining Activities

The existing physical condition of all areas within the watershed that have been mined are in moderate condition. Most of the BLM lands mined within the watershed have been adequately reclaimed where operations have been terminated.

e. Cultural Resources

There are some recorded cultural sites within the watershed. These are primarily along the Rogue River in the western portion of the watershed. There have been some archaeological surveys completed in the past throughout the watershed. Those surveys were completed when evaluating proposed ground disturbance activities over the years such as timber sales, road construction, and other projects.

f. Lands/Realty

The land pattern of BLM ownership within the watershed is mostly a scattered mosaic. In general, the land patterns have been molded, first by the alternate section pattern of O&C railroad revestment land and, since then, by the transfer of public lands from the United States to various private landowners through several different Congressional Acts. This left the lands owned by the United States and administered by the BLM scattered with legal access nonexistent in some cases. This also leaves the private landowners with access problems and needs that entail rights-of-way across BLM-administered lands.

Rights-of-way issued to private landowners include roads, water systems, power lines, phone lines, and three communication sites. The actual locations of these rights-of-way can be found in master title plats kept updated at the Medford District BLM Office.

Rights-of-way, leases, permits, etc., are processed by evaluating the proposed actions as outlined in the National Environmental Policy Act. These types of proposed actions include communication site, water diversions, roads, and utilities. This evaluation entails writing environmental reports to determine impacts that may occur as a result of implementing the proposed action. Mitigation is recommended to minimize or eliminate those identified impacts. The RMP outlines guidance to consider when reviewing proposed actions regarding potential resource conflicts that may occur.

g. Illegal Dumping

Illegal dumping occurs throughout the watershed. The BLM lets dump cleanup contracts annually within the watershed to attend to this problem. Some measures such as road gating and blocking have deterred dumping and may be important long-term measures to eliminate this problem. Law enforcement activities can deter dumping if citations are issued with publicity in the local papers. The major areas where dumping occurs are on Savage Creek Road and dead-end spur roads throughout the watershed.

I. FIRE MANAGEMENT

1. Fundamental Changes to the Fire Regime

The historic fire regime for the watershed has been that of a low-severity regime. This regime is characterized by frequent fires of low intensity. The exclusion of fire occurrence (both natural and prescribed) has lead to a shift in the fire regime to an unnatural, high-severity regime where fires are infrequent, usually high-intensity, and cause stand replacement. Where natural high-severity fire regimes normally occur (e.g., northern Cascades or Olympic Mountains), fire return intervals are long and usually associated with infrequent weather events such as prolonged drought or east wind, low-humidity events and lightning ignition sources. Southern Oregon and the Grants Pass Watershed have the same weather conditions and topography that created the former low-severity fire regime. The change in the fire environment has been the fuel conditions created since the removal of frequent fire. This has caused a vegetation shift to dense, overstocked stands of less fire resistant species, with an increase in dead and down fuels. Simultaneously, a dramatic increase in human ignition sources has occurred. This has created a current condition for large, increasingly destructive, difficult to suppress wildfire with the capability to destroy many of the resource and human values present in the watershed. The Walker Mountain Fire (in the adjacent Jumpoff Joe Watershed) in 1988 is an example. This fire burned over 2,100 acres and was nearly 90% high intensity, stand replacement fire. Homes were threatened with destruction for nearly a week before suppression forces could control the spread of the fire. Other similar major and destructive fires include Hull Mountain in 1994, and East Evans Creek in 1992.

2. Current Condition

The data collected for the watershed for hazard, ignition risk, and values at risk for loss from wildfire are summarized in Tables III-11 through III-15. Ratings are displayed on Maps 15, 16 and 17. Rating classification criteria are summarized in Appendix G.

Hazard, risk, and value at risk are conditions that are used to better understand and plan for potential fire management problems and identify opportunities to manage the watershed to meet goals, objectives and desired future conditions. Wildfire occurrence can often prevent the successful achievement of short term and mid-term land management goals and objectives. Stand replacement wildfire can prevent the development of mature and late-successional forest conditions as well as convert existing mature forests to early seral forests.

Table III-11: Hazard Classification

Ownership (53,640 Acres Total)	High Hazard	Moderate Hazard	Low Hazard
BLM Acres (12,539) Percent	7,639 61%	4,567 36%	332 3%
Other Ownership Acres (41,101) Percent	23,307 57%	16,697 41%	1,097 2%
Total **Acres** **Percent**	**30,946** **57%**	**21,264** **40%**	**1,429** **3%**

For the Grants Pass Watershed as a whole, hazard is disproportionately in the high and moderate classes. Only 3% of the area in a low hazard condition and over half the total acres in a high hazard condition. The trend in fuel and vegetation shifting to increasingly high hazard conditions will continue over the next several decades to create increasingly high fuel hazard. Within the next 10 to 15 years it is anticipated that high hazard level will remain constant unless reduced through prescribed treatments or wildfire occurrence.

Risk is defined as the source of ignition. Human population and use within the watershed creates high risk for wildfire occurrence.

Table III-12: Fire Risk Classification

Ownership (53,640 Acres)	**High Risk**	**Moderate Risk**	**Low Risk**
BLM Acres 12,539	11,112 89%	977 8%	450 3%
Other Ownership Acres 41,101	37,830 92%	1,992 5%	1,279 3%
Total Acres Percent	**48,942 91%**	**2,969 6%**	**1,729 3%**

Table III-13: Value at Risk Classification

Ownership (Total 53,640 Acres)	**High Value**	**Moderate Value**	**Low Value**
BLM Acres 12,539	3,334 27%	4,430 35%	4,775 38%
Other Ownership Acres 41,101	30,987 75%	4,418 11%	5,696 14%
Total Acres Percent	**34,321 64%**	**8,848 16%**	**10,471 20%**

Values at risk are the resource and human values for components of the watershed. The watershed has nearly two-thirds of the area in high values. This is due largely to the amount of private lands, especially residential areas. As residential lands increase in number and spread further to the boundaries of government ownership the amount of high value in the watershed will increase.

Table III-14: Areas of High Rating in Hazard, Risk, and Values at Risk

Ownership	High Concern Areas
BLM Acres 12,539	1,979 16%
Other Ownership Acres 41,101	17,005 41%
Total Acres / Percent **53,640**	**18,984** **35%**

Table IV-15 (see also Maps 15, 16 and 17) indicate the lands which have been classified as high in all three factors (hazard, risk, and value at risk). The 35% total amount in the watershed is a high percentage. It is especially critical because most of the high areas are located in the residential lower elevations, and drainage valley bottoms.

The Grants Pass Watershed has over a third of the area rating as high in all three factors. The large amounts of lands with high values at risk and the high level of risk of wildfire occurrence demonstrates the urgent need for management actions and activities that will decrease the potential for large stand replacement wildfire occurrence.

J. SPECIES AND HABITATS

1. Terrestrial Habitats

a. Botanical

The responsibilities of the federal agencies include the active management of special status species and their habitats, Survey and Manage species and their habitat, special areas and native plants. The following are special status protection categories used as guidelines for management of special status species and their habitats.

Listed and proposed listed species are those species that have been formally listed by the U.S. Fish and Wildlife Service (USFWS) as endangered or threatened or officially proposed for listing. The goal is to enhance or maintain critical habitats and increase populations of threatened and endangered plant species on federal lands. The goal is also to restore species to historic ranges consistent with approved recovery plans and federal land use plans after consultation with federal and state agencies.

Survey and Manage species were identified as needing special management attention by the Northwest Forest Plan ROD in Table C-3 (USDA/USDI-ROD 1994). These species must be managed at known sites and located prior to ground-disturbing activities (Survey Strategy 1 and 2). Some species listed in the Northwest Forest Plan need to be inventoried extensively and surveyed on a regional basis (Survey Strategy 3 & 4).

Candidate and Bureau-sensitive species are federal or state candidates and those species considered by the BLM to be of concern because they may become federal candidates. The goal is to manage their habitat to conserve and maintain populations of candidate and Bureau-sensitive plant species at a level that will avoid endangering species and therefore, listing any species as endangered or threatened by either state or federal government.

State-listed species and their habitats are those plants listed under the Oregon Endangered Species Act. Conservation will be designed to assist the state in achieving their management objectives.

Bureau-assessment species are those species considered by the State BLM office as important species to monitor and manage but not on as crucial a level as candidate or Bureau-sensitive species. The goal is to protect and/or manage where possible so as not to elevate their status to any higher level of concern.

Bureau-tracking and *Bureau-watch* species are not currently special status species, but their locations are tracked during surveys to assess future potential needs for protection.

Table III-15 lists special status plants found within the Grants Pass Watershed. Twelve populations of *Cypripedium fasciculatum*, three populations of *Cypripedium montanum*, one population of *Plagiobothrys figuratus ssp. corallicarpus* and two populations of *Carex livida* have been located in the watershed. The populations were found during timber sale and related project surveys, the total acreage covering only 27% of BLM lands in the watershed. Two Bureau tracking and Bureau watch species were also found during these surveys including *Perideridia howellii* and *Scribneria bolanderi*.

Since little of the Grants Pass Watershed has been surveyed, current conditions must be based on a discussion of potential habitats of the species that have been found. There are late-successional conditions in the watershed which provide habitat for the following species: *Cypripedium fasciculatum*, (Clustered Ladyslipper) (CYFA) and *Cypripedium montanum*, (Mountain Ladyslipper) (CYMO). According to Appendix J of the Northwest Forest Plan, CYFA and CYMO are most likely found in areas with 60%-100% shade provided by older stands of various plant communities within Douglas-fir forests. It notes that although these species are not attached to a specific vegetation community they are, more importantly, dependent on specific microsite characteristics, including high percent shading, high moisture and undisturbed mychorrhizal connections in older-age class forests. The plant series most likely to harbor these orchids within the Grants Pass Watershed is the Douglas-fir series in a mature condition class. Currently 52% of the BLM land in the watershed falls into this plant series but only 15% of BLM land is in a mature condition class. The actual viable habitat for these species would be even smaller and limited to microsites with moister, north aspects, larger condition classes and 60%-90% canopy closure. Without intensive field surveys it is difficult to determine the actual amount of habitat that exists for these two species in the watershed because microsite characteristics cannot be determined from vegetation maps. The high population frequency found so far in such a small portion of the watershed suggests that high potential exists for *Cypripedium* species in the rest of the watershed.

The Douglas-fir plant series is mostly in over-dense stands due to lack of fire. The watershed is at high risk for catastrophic fire which would virtually eliminate the special status species dependent on late-successional conditions. Although the *Cypripedium* species listed have been known to tolerate, and possibly even thrive from low-intensity fire, it has also been shown that such plants will not survive high-intensity fire.

Other special status plant habitats that have been extremely limited in extent by development are native grassland/schlerophyllous shrub/oak woodland savannah community types found in valley bottoms and adjacent low elevation slopes. These community types form a mosaic valley habitat interspersed with seasonally wet areas. About 29% of BLM land in the Grants Pass Watershed is in the white oak or pine/hardwood plant series, which include wet grassland openings. The special status species, *Plagiobothrys figuratus ssp. corallicarpus* and *Carex livida* are species found in these openings in the Grants Pass Watershed.

Plagiobothrys figuratus ssp. corallicarpus has only been found in three other locations on BLM lands. Twenty small sites in the Sams Valley, Grants Pass and New Hope areas, all on private land, are all that are currently known to exist. The species habitat is along seasonal creeks and vernal wet swales. Much of the habitat has had intensive grazing, which appears to have detrimental impacts on the species. It apparently has been extirpated from areas which have received continuous heavy grazing and is still vigorous in sites receiving no grazing (Brock 1993). One location is known in the Grants Pass Watershed on BLM land. The area immediately surrounding the population will be used as a special forest products area for manzanita harvest. The population will be buffered from this activity. Further survey of BLM lands in the watershed should take place for this extremely rare species. The species, *Carex livida*, has similar habitat requirements and was found in the immediate vicinity of the *Plagiobothyrus figuratus ssp. corallicarpus* population.

Invasion of noxious weeds could eventually affect special status plants. Though a thorough inventory of noxious weeds has not been completed in the watershed, their occurrence has been documented. They are most common in the non-forested areas where pastures or grasslands have been invaded by such species as star thistle, scotchbroom or annual exotic grasses. These species are a threat because they compete with native vegetation, reducing plant diversity.

A major data gap is the lack of information regarding non-vascular plants in the watershed. A rough estimate from Table C-3 (ROD), Survey and Manage species, shows that numerous non-vascular species could be found in the vicinity of the Grants Pass Watershed (USDA/USDI-ROD 1994). However, no surveys have been done for non-vascular plants to this date. Surveys will begin on 1999 projects for these species.

Table III-15: Special Status Plants - Grants Pass Watershed

Species Name	Species Status	Habitat
Cypripedium fasciculatum	SM/SC/BS	Moist mixed evergreen with filtered sun
Plagiobothrys figuratus ssp. corallicarpus	BS	Wet meadow openings in pine/oak woodlands
Cypripedium montanum	SM	Moist to dry mixed evergreen
Carex livida	BA	Wet meadow openings in pine/oak woodlands

SC = Species of Concern, SM = Survey and Manage species, BS = Bureau Sensitive, BA = Bureau Assessment

b. Wildlife Species and Habitats

(1) Introduction

The Grants Pass Watershed contains a diverse array of wildlife. As many as 11 species of bats, 12 species of amphibians, 18 species of reptiles, hundreds of species of birds, and many thousands of species of insects may occur here. All historically present species except perhaps three mammals (grizzly bear, wolf and wolverine) are thought to have the potential to occur in the watershed.

BLM is the principal federal agency responsible for managing public lands within the watershed. Part of the Bureau's responsibility is the management of fish and wildlife habitat as well as sensitive species. This is primarily accomplished by maintaining native habitats. There are several habitats of concern in the watershed and numerous unique features.

(2) General Habitats

Wildlife habitats of southwest Oregon are extremely complex. Terrain, climatic factors and vegetation combine to create the wealth of habitats found from the valley floor to the peaks of the Siskiyou Mountains. The land found above the valley floor on the eastern half of the Grants Pass Watershed is dominated by coniferous forests, while the western half is dominated by pine and hardwood forest. The age and the structure of these forests range from saplings to old growth. Within the coniferous forest, hardwoods are a significant component contributing to structural and vegetative diversity. Habitats found throughout the watershed include meadows, riparian areas, chaparral, alder thickets, oak stands, Jeffrey pine savannah and a variety of other unique areas. The valley floor of the Grants Pass Watershed is dominated by a mix of grasslands mingled with conifers and hardwood trees. Habitats found here include oak savannahs, meadows, pine forest, chaparral, and riparian.

Different plant communities support the array of native wildlife. Animals require food, water, shelter and space to breed and raise young during their lifetime. Some species are adapted to a particular habitat (specialist) while others utilize a great deal of different plant communities to fulfill their needs (generalists).

Habitats that are an issue in the Grants Pass Watershed include mature and old-growth forest, meadows, pine stands, oak groves, Jeffrey pine savannahs, oak savannahs and riparian habitat. All of the previously mentioned habitats have been impacted by human activity in the watershed.

(3) Valley Habitats

The Grants Pass Watershed is composed of numerous drainages flowing toward the mainstem of the Rogue River. These drainages are typified by an area of valley habitat and steep timbered hillsides. Due to the extensive amount of agriculture and urban development in the watershed, undisturbed native valley habitats are scarce. Continued current threats to valley habitat types include fire suppression, agriculture and urban development. This development of the valley has led to habitat fragmentation which has impacted the effectiveness of these habitats for wildlife.

Most of the valley floor and associated native habitat are under private ownership. Within the center of the watershed lies the Grants Pass urban growth boundary. Outside this boundary homesites are distributed in rural fashion. The landscape is largely broken up by houses, roads, fences and non-native vegetation. Of particular concern is the remaining oak savannah riparian and Ponderosa pine savannah habitat. These habitats have been identified as three of the five critical habitats by the Oregon/Washington neotropical bird working group. It is assumed further development of these habitats will have a negative impact on neotropical migrant birds.

Federally-administered tracts of land on the valley floor are predominately located in the western portion of the watershed in the Vannoy and Dutcher Creek drainages. These areas are dominated by Oregon white oak, Ponderosa pine, and manzanita and support a wide array of wildlife species (see Appendix E).

Native valley habitats have shown some of the greatest decline of plant communities in southwestern Oregon. Due to the changing nature of private land management the remaining tracts of public land are critical in insuring that this habitat and the biodiversity it supports continues to be represented in the valley. These stands provide primary nesting habitat for acorn woodpeckers *(Melanerpes formicivorous)* and western bluebirds *(Sialia mexicana)* as well as winter range for blacktail deer *(Odocoileus hemionus)*. Smaller mammals using this habitat include raccoon *(Procyon lotor)* and grey fox *(Urocyon cinereoargenteus)*.

(4) Upland Habitats

Most of the federally-administered lands are found in the eastern portion of the watershed in the uplands. Here, forests dominate the landscape, with numerous species of conifers, hardwoods, shrubs, and herbaceous plants. Many of the hardwoods are berry and mast producers that offer a rich food source for wildlife. Mast crop producers include California black oak *(Quercus kelloggii)*, Oregon white oak *(Quercus garryana)*, tanoak (*Lithocarpus densiflorus*) and California hazel *(Corylus cornuta)*. Berry producing plants such as Pacific madrone *(Arbutus menziesii)* and manzanita *(Arctostaphylos spp.)* are also important crop producers for wildlife. Habitats within the uplands include meadows, riparian areas, chaparral, pine savannahs and oak stands that all add diversity to the forest. Natural disturbances are important in generating and maintaining a number of plant communities and habitats. Human caused disturbances such as logging, mining, and road building, have all affected the condition of the upland forest. Current condition of the forest determines wildlife species abundance, and diversity. The shift from older, structurally diverse forests to younger, structurally simplified forests has benefitted generalists species, but has not been advantageous to species that depend on late-successional habitat. The most extensive disturbance activity in the upland portions of the watershed has been logging. Currently most private lands and county lands are in early seral stage to pole stage with little mature forest. Condition of federally-administered land varies from recent clearcuts to old growth. Most federally-managed coniferous forest stands are in the 11 to 21 inch diameter range. Many of these stands are the result of past timber harvest and are structurally simpler as compared to natural stands. Remaining stands of late-successional habitat are extremely important due to their dramatic decline from historic levels and fragmented nature. Currently 22% of the BLM portion of the watershed remains in late-successional habitat condition (McKelvey Rating System 1 and 2). The remaining late-successional habitat is located in the Savage, Jones and Green Creek drainages. This habitat is heavily fragmented and may not provide a comparable acreage of interior forest conditions due to past entries for forest management.

To facilitate timber extraction numerous roads were constructed throughout the uplands. Areas with high road density are of particular concern because roads have many negative impacts on wildlife. Roads lead to increases in vehicular/human disturbance, provide access for poaching and further fragment areas of late-successional habitat. The watershed has seen a large increase in the road densities on federal land since World War II. Currently, sections with low road densities are uncommon in the watershed. The largest tract with low road density is located in Township 36 South, Range 5 West, Section 3. These remaining sections with low road densities offer important refugia from human disturbance for species such as black bear.

(5) Specialized Habitats

Special and unique habitats are those habitats that are either naturally scarce (caves, springs, mineral licks, etc.), rare because of human influence on the environment (low elevation old growth, oak/grasslands, etc.) or because of natural cycles (snags, meadow production, etc.). Often these habitats receive a greater level of use by wildlife than surrounding habitats, or are essential for certain aspects of a particular animal's life history (e.g., hibernation).

The Grants Pass Watershed contains a number of unique habitats. The continued maintenance of these habitats will determine presence of many sensitive species. Sensitive habitats of issue are discussed in the following paragraphs.

Old-growth forest habitat is forest composed of a multi-canopy structure, dominated by large trees, snags and large down logs. Due to the wide variety of niches, these forests have a greater diversity of wildlife species than do younger forested stands. This habitat type is restricted to relict, fragmented stands scattered in the western portion of the watershed. Many of these stands are too small in size to meet the needs of some late-successional species. Due to the limited amount of this habitat found in the watershed, all remaining stands are important contributors to maintaining biodiversity. Currently there is no old-growth forest in the watershed outside these federally-managed stands.

Late-successional forests are those forests that are a minimum of 80 years of age, multi-canopied, with snags, and large down logs. The federal government is required to maintain 15% of the forest lands they manage in a late-successional condition. These areas are to be identified in the watershed analysis process. Ideally these stands would be distributed across the landscape, and would be the largest remaining patches to provide "interior" forest conditions. Narrow strips of late-successional habitat and riparian reserves generally do not contribute interior forest habitat due to the "edge effect" which increased by irregular shapes and small sizes. The edge to interior ratio effects how useful the stand is for late-successional species. Late-successional stands in drainages such as Savage, Jones and Green Creeks where few stands remain are important in supporting late-successional biodiversity.

Meadows under federal ownership are more common in the Grants Pass Watershed in comparison to adjacent watersheds. Shallow soils, perched water tables, and old homesteads are the most common source of these meadows. Earlier in the century, many natural meadows were converted to agricultural land by homesteaders. Currently, the most significant threat to this habitat is tree encroachment due to the disruption of the natural fire cycle. Meadows are the primary habitat for a number of species such as California vole (*Microtus californicus*) and the western pocket gopher (*Thomomys mazama*) and are the primary feeding location for species such as the great grey owl (*Strix nebulosa*) and the American black bear (*Ursus americanus*). Table E-6 in the appendix displays known meadows in the watershed and suggested treatment to maintain these meadows.

Big game winter range in the Grants Pass Watershed is in poor condition in comparison to adjacent watersheds. Winter range is defined as land found below 2,000 feet in elevation, but may extend higher in elevation on southern exposed slopes. Ideally, these areas are a mixture of thermal cover, hiding cover, and forage. Historically the valley floor and adjacent slopes served as winter range for deer and elk. Increased urbanization of the valley floor is the single greatest threat to this habitat type in the watershed. Other threats include agriculture, introduction of exotic vegetation and the suppression of the natural fire cycle. Most of the remaining winter range has had an absence of fire for more than 50 years. Areas of exceptional quality winter range are found on the southern slopes of Jones and Bloody Run Creeks.

Dispersal corridors aid in gene pool flow, natural reintroduction and successful pioneering of species into previously unoccupied habitat. Generally these corridors are located in saddles, low divides, ridges, and along riparian reserves. Without such corridors many isolated wildlife habitats would be too small to support the maximum diversity of species. Numerous ridgelines within the watershed allow for localized dispersal. Ridges connecting Fielder Mountain to Sexton Summit, via Old Baldy, Elk Mountain and Robert's Mountain are heavily used by elk, bear, deer, mountain lions and other species as travel corridors. Dispersal between drainages also occurs through low divides. Two such divides are located in the northeast corner of the watershed: one in Township 35 South, Range 5 West, Section 33, Township 36 South, and the second in Range 5 West, Section 3. Both of these divides support continuous coniferous forest from the Grants Pass Watershed into the Jumpoff Joe Watershed, and allow species dispersal between watersheds.

In the southern portion of the watershed, the north aspects of the high ridges from Baldy Mountain south to Grants Pass Peak and onto Billy Mountain, Mt. Isabelle, Timber Mountain, Anderson Butte, Wagner Butte and Mt. Ashland offer near contiguous conifer connection which offers potential for dispersal of species requiring this habitat type. Many of these key "flow" locations have the potential to support older forest, but currently do not due to past management activities and other disturbances. Other remaining blocks of older forest that contiguously run from the valley floor to the higher mountain ridges allow for "the elevator effect" which permits for seasonal dispersal for late-successional species. These stands are particularly important in the Jones, Greens and Savage Creeks where the remaining late-successional forest remain.

Riparian reserves were designed in the Northwest Forest Plan to function as dispersal corridors. Due to the past management activities and the checkerboard ownership pattern in this watershed, it is unlikely that many of these reserves currently function as corridors for late-successional species.

Oak woodlands/savannahs are a rich resource providing nesting habitat, mast crop production, big game wintering range and sheltered fawning areas. Historically oak/pine grasslands dominated the valley floor. Increased agricultural use, urbanization, introduction of exotic plants, and changing of natural drainage patterns have all impacted native oak/grasslands. In addition, fire has been excluded for nearly 80 years which has allowed pine, fir and cedar to become firmly established in the understory of oak woodlands. Stands of oak/grasslands administered by the federal government are scattered throughout the watershed, with the majority of these stands being located on the western side of the watershed. Most of these sites are in poor condition due to fire suppression and the introduction of exotic vegetation.

Mine adits play a critical role in the life history of many animals, providing shelter from environmental extremes, seclusion and darkness. Mines are the primary habitat for species such as the Townsend's big-eared bat *(Corynorhinus townsendii)*, a ROD buffer species and Bureau-sensitive species. Other species such as the bushy-tailed *(Neotoma cinerea)* and the cave cricket *(Ceuthophilus spp.)* use caves as their primary residence. These sites are also used seasonally for a number of species such as swarm sites (breeding sites) for bats and den sites for porcupine *(Erethizon dorsatum)*. A number of mine adits are located on BLM land. One of the largest maternity colony/hibernaculum in Oregon for Townsend's big-eared bats is located in the Mt. Baldy area. Maintaining these keystone sites are essential for preserving the presence of the species in the region. Recreational use of mines limit their value for wildlife, displacing easily disturbed species.

Deer fawning/elk calving areas are critical for successful maintenance of deer and elk populations. Key components include quality forage, water, cover, and gentle warm slopes. These areas should be free from human disturbance. Fawning areas on federally-administered lands are found in many small meadows scattered throughout the watershed, and in areas with southern exposures. Fawning areas on private land are found throughout the watershed but vary in quality due to disturbance. An elk calving area is located southeast of Fielder Mountain.

(6) Special Status Species

There are 54 potential sensitive species in the watershed (19 birds, 13 mammals, seven amphibians, five reptiles, eight insects, and one mollusk). The habitat requirements for these animals vary from species to species.

The northern spotted owl is the only documented species listed under the Endangered Species Act known to occur within the watershed. There are two other listed species that could occur within the watershed, including the peregrine falcon and the bald eagle. In addition to the listed species there are candidate species, Bureau-sensitive species, ROD buffer species, as well as Survey and Manage species (see Northwest Forest Plan Record of Decision Section, C-49).

Table III-16 lists the known and potential special status species found in the watershed, along with legal status and level of survey to date. This list includes species listed under the ESA, proposed for listing and candidate species being reviewed by the U.S. Fish and Wildlife Service. State listed species as well as Bureau-assessment species and species listed in the ROD as "Buffer" species are also listed. (For more information on this list and habitat needs see Appendix section.) These species are, collectively, referred to as "species of concern" in this watershed analysis.

Table III-16: Grants Pass Watershed Special Status Species Vertebrates

Common Name	Scientific Name	Presence	Status	Survey Level as of 5/97
Gray wolf	*Canis lupus*	absent	FE,SE	none to date
White-footed vole	*Aborimus albipes*	unknown	BS,SP	none to date
Red tree vole	*Aborimus longicaudus*	present	SM	limited surveys
California red tree vole	*Aborimus pomo*	unknown	BS	none to date
Fisher	*Martes pennanti*	unknown	BS,SC	none to date
California wolverine	*Gulo gulo luteus*	unknown	BS,ST	none to date
American marten	*Martes americana*	unknown	SC	none to date
Ringtail	*Bassacriscus astutus*	unknown	SU	none to date
Peregrine falcon	*Falco peregrinus*	unknown	FE,ST	none to date
Bald eagle	*Haliaeetus leucocephalus*	seasonally	FT,ST	none to date
Northern spotted owl	*Strix occidentlis*	present	FT,ST	limited surveys
Northern goshawk	*Accipiter gentilis*	unknown	BS,SC	some surveys
Mountain quail	*Oreortyx pictus*	present	BS	none to date
Pileated woodpecker	*Dryocopus pileatus*	present	SC	none to date

Table III-16: Grants Pass Watershed Special Status Species Vertebrates

Common Name	Scientific Name	Presence	Status	Survey Level as of 5/97
Lewis' woodpecker	*Melanerpes lewis*	unknown	SC	none to date
White-headed woodpecker	*Picoides albolarvatus*	unknown	SC,BF	none to date
Flammulated owl	*Otus flammeolus*	unknown	SC,BF	none to date
Purple martin	*Progne subis*	unknown	SC	none to date
Great gray owl	*Strix nebulosa*	unknown	SV,SM	limited surveys
Western bluebird	*Sialia mexicana*	present	SV	none to date
Acorn woodpecker	*Melanerpes formicivorus*	suspected	SU	none to date
Tricolored blackbird	*Agelaius tricolor*	unknown	BS,SP	none to date
Black-backed woodpecker	*Picoides arcticus*	unknown	SC,BF	none to date
Northern pygmy owl	*Glaucidium gnoma*	present	SU	limited surveys
Grasshopper sparrow	*Ammodramus savannarum*	unknown	SP	none to date
Bank swallow	*Riparia riparia*	migratory	SU	none to date
Townsend's big-eared bat	*Corynorhinus townsendii*	present	BS,SC	limited surveys
Fringed myotis	*Myotis thysanodes*	present	BS,SV,BU	limited surveys
Yuma myotis	*Myotis yumanensis*	present	BS	limited surveys
Long-eared myotis	*Myotis evotis*	present	BS,BU	limited surveys
Hairy-winged myotis	*Myotis volans*	present	BS	limited surveys
Silver-haired bat	*Lasionycteris noctivagans*	suspected	BF	limited surveys
Pacific pallid bat	*Antrozous pallidus*	unknown	SC	limited surveys
Western pond turtle	*Clemmys marmorata*	present	BS,SC	incidental sightings
Del Norte salamander	*Plethodon elongatus*	unknown	BS,SV,SM,BF	limited surveys
Foothills yellow-legged frog	*Rana boylii*	suspected	BS,SU	limited surveys
Red-legged frog	*Rana aurora*	unknown	BS,SU	none to date
Clouded salamander	*Aneides ferreus*	suspected	SC	limited surveys
Southern torrent salamander (variegated salamander)	*Rhyacotriton variegatus*	unknown	BS,SV	limited surveys
Black salamander	*Aneides flavipunctatus*	suspected	SP	limited surveys
Sharptail snake	*Contia tenuis*	suspected	SC	none to date

Table III-16: Grants Pass Watershed Special Status Species Vertebrates

Common Name	Scientific Name	Presence	Status	Survey Level as of 5/97
California mtn kingsnake	*Lampropeltis zonata*	present	SP	incidental sightings
Common kingsnake	*Lampropeltis getulus*	present	SP	incidental sightings
Northern sagebrush lizard	*Sceloporus graciosus*	unknown	BS	none to date
Tailed frog	*Ascaphus truei*	suspected	SV	none to date

STATUS ABBREVIATIONS:

FE--Federal Endangered
FT--Federal Threatened
FP--Federal Proposed
FC--Federal Candidate
SE--State Endangered
ST--State Threatened
SM--Survey and Manage

SC--ODFW Critical
SV--ODFW Vulnerable
SP--ODFW Peripheral or Naturally Rare
SU--ODFW Undetermined
BS--Bureau Sensitive
BF--Buffer Species

Table III-17: Grants Pass Watershed Special Status Species Invertebrates

Common Name	Presence	Status	Survey Level as of 5/97
Burnells' false water penny beetle	unknown	BS	none to date
Denning's agapetus caddisfly	unknown	BS	none to date
Green Springs Mtn farulan caddisfly	unknown	BS	none to date
Schuh's homoplectran caddisfly	unknown	BS	none to date
O'Brien rhyacophilan caddisfly	unknown	BS	none to date
Siskiyou caddisfly	unknown	BS	none to date
Alsea ochrotichian micro caddisfly	unknown	BS	none to date
Franklin's bumblebee	unknown	BS	none to date
Oregon pearly mussel	unknown	BS	none to date

BS--Bureau Sensitive

(7) Survey and Manage Species

Table III-18 presents the species that are to be protected through survey and management guidelines as outlined in the NFP-ROD. This table also describes the level of protection and the amount of surveys conducted to date. It is suspected that the current Late-Successional Reserve network will not meet the needs of these species, such that further restrictions within matrix lands are necessary to ensure long-term viability of their populations. All known sites will receive some level of immediate protection.

Table III-18: Survey and Manage Species & Buffer Species in the Grants Pass Watershed

SPECIES	PRESENCE	NFP / RMP PROTECTION LEVEL
Del Norte salamander *† *(Plethodon elongatus)*	present	Manage known sites and survey prior to activities, within matrix land buffer length of one potential site tree or 100 feet whichever is greater.
White-headed woodpecker* *(Picoides albolarvatus)*	unknown	On matrix land no cutting snags 20" DBH or over. Maintain green trees to provide for 100% population potential
Black-backed woodpecker* *(Picoides pubescens)*	unknown	On matrix land no cutting snags 20" DBH or over. Maintain green trees to provide for 100% population potential
Flammulated owl* *(Otus flammeolus)*	unknown	On matrix land no cutting snags 20" DBH or over. Maintain green trees to provide for 100% population potential
Great gray owl † *(Strix nebulosa)*	unknown	One-quarter mile protection zone around nest sites, survey prior to activities, 300-foot buffers of meadow and natural openings.
Red tree vole † *(Aborimus pomo)*	present	Manage known sites and survey prior to activities

* = Buffer species † = Survey and Manage

(8) Threatened or Endangered Species

The Northern Spotted Owl (Status: Threatened) is the only known species listed under the ESA known to nest in the watershed. There are five known centers of activity with 100-acre cores and another site outside the watershed whose provincial home range (1.3 miles radii) may be affected by activities occurring inside the watershed (see Appendix for the list of sites and results of nesting surveys). An active site is one in which a territorial single or pair has occupied the site at least once since 1985. Surveys for northern spotted owls have been conducted since the mid-1970's within the watershed. Early surveys were opportunistic until 1985 when areas were surveyed prior to a proposed management activity.

The U.S. Fish and Wildlife Service (USFWS) uses a viability rating for suitable habitat around spotted owl sites as an indication of the site's viability and productivity. Sites are considered viability over the long term if 50% of the area within 0.7 mile of the center of activity, or approximately 500 acres is suitable nesting, foraging and roosting habitat; and there is 40% of the area within 1.3 miles or approximately 1,388 acres.

Table E-3 in the Appendix describes the condition of the sites within the watershed or adjacent to the watershed. No sites within the watershed exceed the 1,388 acres judged necessary for long-term viability.

Spotted owl habitat managed by the Bureau of Land Management has been analyzed using the McKelvey rating system. The McKelvey rating system is based on a model that predicts spotted owl population based on habitat availability (see Appendix E for more information on this system). Stands were examined for criteria such as canopy layering, canopy closure, snags, woody material and other features. Biological potential of a stand to acquire desired conditions is also taken in consideration. During the spring of 1997 stands were visually rated and placed into the six categories. Map 13 displays the results of this study. Table III-19 summarizes the amount of habitat available for spotted owls in the watershed on lands administered by the BLM and on non-federal lands (State of Oregon, Josephine County and private). There are 907 acres of spotted owl nesting, roosting, and foraging habitat (McKelvey Rating #1) found on BLM-administered land in the watershed (1.6% of watershed). The largest contiguous blocks are located in Greens Creek drainage. Remaining optimal habitat in the watershed is heavily fragmented, particularly in the Jones, Savage and Little Savage Creek drainages.

The BLM portion of the Grants Pass Watershed has 1,900 acres (3.5% of watershed) of northern spotted owl roosting and foraging habitat (McKelvey Rating #2). The largest patches are found in the Greens, Jones and Savage Creek drainages.

Dispersal habitat for spotted owls is defined as stands that have a canopy closure of 40% or greater, and open enough for flight and predator avoidances. This habitat is concentrated in the east side of the watershed, with large concentrations in the Savage and Jones Creek drainages.

(9) Private and County Land

In 1997, an effort was made by the BLM to classify the forest type using the McKelvey model on private and county lands in the watershed. This information was largely gathered through photo interpretation, ground truthing and roadside reconnaissance. This endeavor gives a fairly accurate depiction of the status of private, state and county lands. Table III-19 displays the amount of available habitat for northern spotted owls on private, state and county land in the watershed. There are 44 acres of spotted owl roost/foraging habitat on private land within the watershed. Most of the private land does not have the potential to support late-successional habitat (35,497 acres). Currently there are 2,953 acres of private land judged as functioning as dispersal habitat for the northern spotted owl.

Table III-19: McKelvey Rating Class Acreages

	BLM Lands		**Non-Federal Lands**		**BLM and Non-Federal Lands**	
Class	**Acres**	**Percent in Watershed**	**Acres**	**Percent in Watershed**	**Acres**	**Percent in Watershed**
1 **Spotted owl nesting, roosting, and foraging habitat**	907	7%	0	0%	907	2%
2 **Spotted owl roosting and foraging habitat**	1,900	15%	44	0.1%	1,944	4%
3 **Currently does not meet 1 or 2 criteria, has potential to.**	2,858	23%	4,793	12%	7,651	14%
4 **Will never meet 1 or 2 criteria**	4,688	37%	35,497	86%	40,185	75%
5 **Currently does not meet 1 or 2, but meets dispersal habitat**	2,187	17%	766	2%	2,953	6%
6 **Will never meet 1 or 2, but meets dispersal**	0	0%	0	0%	0	0%
Totals	**12,540**		**41,100**		**53,640**	

***Based on field work in summer of 1997.** **5/26/98**

Marbled Murrelet (Threatened) - There is no suitable habitat for the marbled murrelet within the Grants Pass Watershed.

Bald Eagles (Threatened) - There are no known nest sites documented within the watershed. Nesting habitat does occur on federally-administered land. Preferred nesting habitat consist of older forest, generally near water, with minimal human disturbance.

Peregrine Falcon (Threatened) nest on ledges located on cliff faces. There are no known historic or current peregrine falcon nests in the watershed.

(10) Other Species

Neotropical Migratory Birds: A number of neotropical birds are known to inhabit the Grants Pass Watershed. Neotropical migrants are species of birds that winter south of the Tropic of Cancer, and breed in North America. More then twenty years of Breeding Bird Surveys (BBS), Breeding Bird Census (BBC), Winter Bird Population Study, and Christmas Bird Counts indicate that many species of birds are experiencing a precipitous decline. This is particularly true for birds that use mature and old-growth forest either in the tropics, in North America or both (DeSante & Burton 1994). Rates of decline are well documented for birds on the east coast of North America, and less so on the west coast. In 1992 BLM signed a multi-agency agreement called "Partners in Flight." The purpose of this program is to establish a long-term monitoring effort to gather demographic information. This monitoring will establish the extent that deforestation and forest fragmentation have on temperate breeding bird populations.

The Grants Pass Watershed contains a number of neotropical migrants that utilize various habitats. Studies conducted on the Medford District have found that neotropical migrants comprise between 42% and 47% of the breeding species at lower elevation forest dominated by Douglas-fir (Janes 1993). In higher elevation forests dominated by white fir, neotropical migrants are less abundant contributing to a smaller portion of the bird species present. In the fall of 1994 a fall banding station was established within the watershed. In the spring of the following year a Migratory Avian Productivity and Survivorship (MAPS) station was established. The purpose of these projects were to establish baseline data on presence and absence of species as well as their productivity (birth rate) and survivorship (death rate). A number of neotropical birds have been detected since 1994. Table III-20 lists the known and suspected neotropicals found in the watershed, habitat used, and national population trends. Habitats of particular concern are valley brushfields, old-growth, riparian, and oak woodlands communities. It is important to keep in mind neotropicals will often use more than one habitat type during various seasons. Overall, 46% of these birds are habitat generalists using four or more habitat types, while 34% are habitat specialists utilizing one or two habitats.

Table III-20: Neotropical Bird Potential in Grants Pass Watershed

Common Name	Presence	Trend*
Green-winged teal	unknown	insufficient data
Sora	unknown	insufficient data
Turkey vulture	present	decline
Osprey	present	stable or increasing
Flammulated owl	unknown	insufficient data
Common nighthawk	present	insufficient data
Rufous hummingbird	present	decline
Calliope hummingbird	unknown	insufficient data
Western kingbird	present	insufficient data
Ash-throated flycatcher	present	insufficient data
Western wood-pewee	present	decline
Olive-sided flycatcher	present	decline

Table III-20: Neotropical Bird Potential in Grants Pass Watershed		
Common Name	**Presence**	**Trend***
Hammond's flycatcher	present	insufficient data
Dusky flycatcher	present	insufficient data
Pacific-slope flycatcher	present	insufficient data
Vaux's swift	present	decline
Tree swallow	present	insufficient data
Northern rough-winged swallow	present	insufficient data
Violet-green swallow	present	decline
Cliff swallow	present	insufficient data
Barn swallow	present	decline
House wren	present	insufficient data
Blue-gray gnatcatcher	present	insufficient data
Swainson's thrush	present	decline
Solitary vireo	present	insufficient data
Warbling vireo	present	insufficient data
Townsend's warbler	unknown	insufficient data
Hermit warbler	present	insufficient data
Black-throated gray warbler	present	insufficient data
Nashville warbler	present	insufficient data
MacGillivray's warbler	present	insufficient data
Yellow warbler	present	insufficient data
Orange-crowned warbler	present	decline
Common yellowthroat	present	stable/increase
Yellow-breasted chat	present	insufficient data
Wilson's warbler	present	decline
Brownheaded cowbird	present	decline
Northern oriole	present	decline
Western tanager	present	decline
Chipping sparrow	present	decline
Green-tailed towhee	present	stable/increase
Black-headed grosbeak	present	stable/increase
Lazuli bunting	present	insufficient data

- Based on information from Partners in Flight in Oregon and might not necessarily represent nationwide figures.

Game Species - Species of game animals located within the Grants Pass Watershed include: elk, blacktailed deer, black bear, mountain lion, wild turkeys, ruffed grouse, blue grouse, grey squirrels, mountain and valley quail. The watershed is located in the Evans Creek game management unit. Management of game species are the responsibility of the Oregon Department of Fish and Wildlife. The entire watershed is open to hunting during the appropriate season for game species. Information from the ODFW indicates that blacktailed deer populations are stable overall and meeting department goals. Elk are present in the watershed, with recent reports of animals in the Evans Creek and Fielder Mountain area.

Black bear populations are extremely hard to monitor due to their secretive nature. The population in the watershed appears to be stable, with recent nuisance complaints along the Rogue River highway area. Cougar sightings in the watershed have increased with their overall population on the rise.

Grouse and quail had a good nesting year in 1997. The population of these birds is cyclic depending on weather conditions. Long-term trends appear to be stable. Wild turkeys have not been introduced in this watershed but appear to have established themselves from adjacent watersheds.

In general, game species are generalists that benefit from edge habitats. Past land management practices both on private and federal lands have increased the overall amount of forest edge within the watershed. In addition, the amount of roads has also increased which in turn impacts the suitability of all habitat types. High road densities have shown to have negative affects on deer and elk populations, and lead to increase poaching opportunities. For these species numbers could be expected to increase with a decrease in the road densities. Remaining unroaded sections offer key refugia for these species.

Band-tail pigeons (Columba fasciata) are known to occur in the watershed. These birds have shown a precipitous decline in population throughout its range since monitoring began in the 1950's (Jarvis, *et al*, 1993). These birds are highly prized as a game species and restrictive hunting regulations have not led to an increase in bird populations. Habitat alteration due to intense forestry practices may partially explain their decrease in population and ongoing research is now trying to answer this question (Jarvis *et al*, 1993). Band-tail pigeons are highly mobile and utilize many forest habitat types. Preferred habitat consists of large conifers and deciduous trees interspersed with berry and mast producing trees and shrubs. In the spring and fall large flocks are seen migrating through the watershed. The birds use this higher elevation feeding on blue elderberries, manzanita berries, and Pacific madrone berries. With the exclusion of fire from the landscape many stands of mast crop producing plants have been negatively impacted.

Cavity dependent species such as western bluebirds and northern pygmy owls *(Glaucidium gnoma)* which use downed logs are of special concern in the watershed because of past silvicultural practices. These practices in the past have focused on even-aged stands that have resulted in deficits of snags and down logs in areas previously harvested. Fire suppression also has a negative effect on the amount of snags in the watershed. Fires, insect infestations and other disturbance events are important generators of snags. Species associated with this habitat type have also declined.

(11) Exotic Species

Many non-native species have become established in the watershed. Introduced exotic species compete with native species for food, water, shelter and space. Bullfrogs (*Rana catesbeiana*) directly compete with native frogs, and consume young western pond turtles (*Clemmys marmorata*). Opossums (*Dedelphis virginiana*) occupy a similar niche with our native stripped skunk (*Mephitis mephitis*) and raccoon (*Procoyon lotor*). They also consume young birds, amphibians and reptiles. Other introduced species include European starlings (*Sturnus vulgaris*), ring-necked pheasants (*Phasianus colchicus*) and turkeys (*Meleagris gallopavo*). These species have some negative impacts on native flora and fauna.

2. Aquatic Habitats

Riparian areas are one of the most heavily used habitats found in the watershed, both by humans and by wildlife. Many life cycle requirements of animals are met in these areas. Aquatic and amphibious species are intrinsically tied to these habitats, as are all the species that feed on these animals. Riparian habitats have been heavily impacted by mining, road building, urbanization, logging, and agriculture. The riparian zone on private lands varies from mature stands of conifers to bare streambanks. Most of the private riparian is dominated by hardwoods and young conifers. The riparian zone on federally-managed lands are generally in better condition than private but still have been negatively impacted by past management practices in some locations.

The amount of instream water flows allowed from the source to the Rogue River determines the usefulness of streams to aquatic species. During low flow periods water withdrawals can determine the absence/presence of many aquatic species. Currently many native aquatic and amphibious species are no longer as prevalent as they were during pre-settlement time as a result of stream flow changes. Beaver *(Castor canadensis)*, river otter *(Lutra canadensis)* and muskrat *(Ondatra zibethica)* were common in the streams on the valley floor prior to settlement. Currently these species have a restricted range in the watershed. Beavers and otters are still present along portions of the Rogue River and muskrat are located in many sloughs and ponds within the watershed. In general, the riparian habitat in the watershed has been degraded from historic conditions and currently is less capable of supporting the historic species diversity.

Current stream conditions within the Grants Pass watershed area are keys to salmonid survival and production. Large woody debris (LWD) is an important component of salmonid habitat. Large, key pieces of downed wood dissipate energy during high water events, hold back spawning gravels and provide refugia for fish and aquatic invertebrates. In addition, these key pieces act as anchors by trapping smaller pieces of wood and other organic matter which is an important food source for aquatic invertebrates. Large wood also increases stream meander and improves floodplain complexity. Riparian trees shade the streams, producing a micro-climate which maintains cooler water temperatures essential for salmonid survival. Salmonid productivity is typically highest around 55°F, and productivity starts to decline as temperatures rise above 58° F. Water quantity is another critical factor in the survival of salmonids. Salmonids require clean spawning gravels for adequate production.

Table III-21 summarizes the miles of fish-bearing streams on BLM lands in the watershed. Maps 7 and 8 show the distribution of salmonids in the watershed.

Table III-21: Miles of Fish-Bearing Stream on BLM Lands in the Watershed

Fish	Miles
Coho Salmon	11
Chinook Salmon	11
Steelhead	14
Cutthroat Trout	15
Rainbow Trout	11

a. Current Stream Conditions

Savage Creek has cutthroat trout in the first two and a half miles. Water quality is adequate, as summer temperatures do not limit ranges of these salmonids. There are few pieces of large instream wood.

Bee Creek, a tributary to Savage Creek, exhibits high summer water temperatures, yet cutthroat trout are found in the first half mile. A thin riparian cover is attributed to the excessive water temperatures.

Greens Creek has good water quality and an adequate supply of pools. Cutthroat trout are found in the first mile.

Jones Creek has five miles of cutthroat trout habitat. Steelhead are found in the first mile. Instream and riparian habitat complexity is limited. There is little large wood and consequently no large pools. Water quality and spawning gravels are adequate.

Bloody Run Creek is a high gradient non-fish-bearing stream. There is minimal large woody debris found in the stream, resulting in poor pool frequency. There are no large riparian trees (>12 inches DBH). The stream runs into an irrigation canal.

Gilbert Creek has been impacted by Grants Pass' increased urbanization. Riparian shade is minimal and concrete lined streambanks have eliminated stream meander and floodplain connectivity. Without wood to dissipate energy during high water events, salmonids have minimal access to refugia and survival is compromised.

Allen Creek has excessive levels of sediment. In most reached places, the stream is embedded by two feet of sand and, as a result, there are no self-sustaining populations.

Fruitdale and Sand Creeks have had a reduction in the floodplain connectivity as a result of the increased urbanization and reduction in riparian reserves especially in the lower valley sections.

Vannoy Creek flows through agricultural lands without any riparian trees for cover. Algae blooms are commonplace and summer water temperatures reach lethal levels for salmonids. Introduced warm water fishes exist in some sections. Past watershed activities have introduced excessive sediment to the stream. In some reaches, the substrate consists of 100% decomposed granite. There are inadequate spawning gravels, high water temperatures and barriers to anadromous fish downstream where the stream enters an irrigation channel.

Little Savage Creek and Fall Creek are perennial non-fish-bearing streams.

In 1976, the Oregon Department of Fish and Wildlife estimated the relative abundance of adult anadromous fish for the following streams.

Table III-22: 1976 Anadromous Fish Counts

Stream	Returning Adult Steelhead	Returning Adult Coho Salmon
Jones Creek	300	25
Fruitdale Creek	210	0
Allen Creek	110	0
Sand Creek	110	0
Savage Creek	40	0
Gilbert Creek	40	0

b. Macroinvertebrates

The only information available on aquatic invertebrates is for Greens and Vannoy Creeks. There is a good caddisfly population in Greens Creek. Vannoy Creek contains a few caddis, mayflies, and snails (*Juga sp.*). The lack of large riparian trees, which shade the streams and keep them cool, has decreased water quality. Additionally, the lack of large instream key pieces of wood prevents energy dissipation during high flood events. Gravels and woody debris get washed out of the system and the much needed macroinvertebrate habitat and food supply associated with those components is lost. As a result, there are inadequate invertebrate populations to support resident fish and juvenile anadromous salmonids in many streams in the Grants Pass watershed area. They all share typically low insect abundance and diversity.

c. Rogue River

Fall chinook salmon: There is an average return of 41,000 fish annually. Adults spawn in the middle Rogue River (especially throughout the Grants Pass watershed area) from late September through January. Juveniles spend four to six months in freshwater before migrating to the ocean near the end of summer.

Spring chinook salmon: Approximately 31,250 hatchery and wild fish return to the Rogue above Gold Ray Dam. The construction of Lost Creek Dam blocked one-third of the spring chinook's spawning grounds. Returning adults enter the Rogue from March through June. Most spring chinook spawn from September to November. Spawning occurs primarily above Gold Ray Dam, although they rest in the lower river throughout the summer prior to spawning. It is at this time when they are particularly affected by *Flexibacter columnaris*, a bacterial pathogen which affects the salmon in elevated water temperatures. Juveniles spend four to eight months in freshwater before entering the ocean.

Winter steelhead: Adults enter freshwater from November through March. Spawning occurs primarily in tributary streams as early as December and as late as June, though typically it occurs from February to April. Juveniles emerge from spawning gravels and spend from one to four years in freshwater before migrating to salt water. An estimated 30% of winter steelhead spend three to five months in the ocean before returning to freshwater as half-pounders. These 12 to16 inch sexually immature fish spend three to five months in fresh water on a mock spawning run. They migrate upstream just past the Grants Pass watershed area before returning to the ocean. Upon returning to the ocean they spend an additional one to four years before returning as sexually mature adults. Winter steelhead are capable of surviving the rigors of spawning and can return several times to spawn, but this is rare.

Summer steelhead: Summer steelhead enter the Rogue River from May through October. More than 95% of the summer steelhead run consist of the half-pounder phase. The summer run half-pounders remain in freshwater for six months and only make it to river mile 50 before returning to the ocean. Sexually mature adults return to the Rogue on their spawning run from August to October. Up to 85% of the adult summer steelhead run migrate to the area between Gold Ray Dam and the mouth of the Applegate River (Everest 1973).

Cutthroat trout: Cutthroat are found in small headwater streams throughout the Rogue basin, and are also found throughout the mainstem of the Rogue River. Cutthroat trout require smaller sized spawning gravel than steelhead or salmon. Consequently, they can exist further upstream than salmon or steelhead. Resident cutthroat do not require access to the ocean and can inhabit isolated reaches provided they have sufficient water temperatures in the summer.

Coho salmon: Adult coho salmon return to the Rogue River from September to December using the mainstem Rogue River as a migration corridor to tributaries. Juveniles spend two years in smaller tributaries, seeking refuge in deep, cool pools. Currently, the wild Rogue River coho salmon are a federally-threatened species. Their numbers have decreased as a result of many factors. Lack of rearing habitat, over fishing, poor ocean conditions, and artificial barriers have all been blamed for their depressed population numbers.

IV. REFERENCE CONDITION

A. PURPOSE

The purpose of this section is to examine how ecological conditions have changed over time as the result of human influence and natural disturbances, and to develop a reference for comparison with current conditions and with key management plan objectives (*Federal Guide for Watershed Analysis, Version 2.2,* 1995).

B. CLIMATE

The climate of southwestern Oregon has not been static. During the Holocene (the past 10,000 years) shifts in temperature and precipitation have affected the type and extent of vegetation, the viability of stream and river flows, fish and animal populations, and human access to higher elevations. Although direct evidence of the past climate and environment is lacking for southwestern Oregon, the broad patterns of climate change experienced throughout the American West can serve as a model. In general, at the beginning of the Holocene temperatures were rising and the climate was warmer and drier than today. This trend continued until sometime after 6,000 years ago, when wetter and cooler conditions began to appear. During the past few thousand years, contemporary climate patterns and vegetation regimes have prevailed. However, during this period environmental forces have not been constant. Fluctuating cycles of drier or wetter conditions, varying in duration, characterize the modern climate pattern (Atwood, Grey 1996).

This long period of drier and warmer conditions began to change at some point in the mid-Holocene. The onset of wetter, cooler conditions gradually changed vegetation patterns, as well as the quantity and distribution of game animals and migrating fish (Atwood, Grey 1996).

The Grants Pass Watershed has a narrow precipitation range, a characteristic not usually seen in the Rogue basin. Usually, there is a wide precipitation range within a given watershed.

C. EROSION PROCESSES

Previous to Euro-American settlement there were more mature forests in the Grants Pass watershed. vegetation, coarse woody debris and organic matter on the forest floor protected the soil from erosion (USDI-BLM, Jumpoff Joe WA 1997).

The historical erosion processes are generally the same as those described under the Current Conditions section. Native people probably did not accelerate the rate of movement by their burning practices because they did not burn on very steep slopes. Native burning practices generally involved burning near level to gently sloping areas in valley bottoms and footslopes and in upland meadows. Their fires were spotty and designed to enhance habitats and thus increase numbers of desirable plant and animal species (BLM, Internal Document, March 13, 1997). The referenced document refers to conditions in southwestern Oregon with specific application in the Grave Creek Watershed. A cursory review of the General Land Office (GLO) maps with notes that were published in the 1850's and 1991 aerial photos indicate that these types of practices did take place. Frequent burning by the natives at low elevations created park-like forests of scattered trees not typical of the dense forests we see today (Pullen 1996). It should be noted that photographs from the late 1800's show dense forested valley bottoms in the areas of the current City of Grants Pass. This indicates that there may have been underburning, however, park-like conditions did not exist.

Concentrated flow (gully and rill) erosion occurred mainly in draws where channels were created. The density of these channels varied with climatic cycles. During wetter cycles the intermittent stream channels were more common. During dry cycles, cobbles, gravel, and plant debris accumulated in the draws, burying the channel (USDI-BLM, Jumpoff Joe WA, 1997). According to Pullen (1996) the natives recognized the value of riparian areas for humans and animals and, therefore, did not burn within them. Furthermore, the riparian areas of class I, II and III and sometimes IV streams are very moist and would not burn as easily as the uplands.

1. Road Effects

Native peoples had foot trails instead of roads. These narrow foot trails had very little effect on erosion, water quality and quantity (USDI-BLM, Jumpoff Joe WA, 1997). In the 1870's, with the settlement of the area, trails and wagon roads were beginning to be constructed (USDI-BLM, Applegate Star-Boaz WA 1997). With increased roads came increased erosion from ditchline erosion, cut bank and fill failures. In the early 1900's a seventeen ton machine called "The Beast" was used to haul lumber over roads; it damaged both bridges and culverts (*GP the Golden Years*) and compacted the soils considerably.

D. HYDROLOGY

1. Floods

Periodic flooding within the Rogue River basin has had devastating consequences on the cultural environment. The rare combination of a warm southwesterly storm system with several inches of rain and an existing snowpack has, at times, produced a massive melt and runoff causing major floods along the Rogue River and its principal tributaries. High water has occurred frequently on the Rogue through the years, and indications are that floods similar to modern ones occurred historically (Atwood, Grey 1996).

Historic floods occurred in 1853 and 1859. The flood of December 1861 was the largest flood on record on the Rogue River. In that year, severe flooding inundated fields along the Rogue River plain west of Grants Pass and destroyed improvements and crops along the Rogue River in the agricultural section from the Applegate River to the mouth of Jumpoff Joe Creek. Other major floods of record also occurred in 1890, 1927, 1955, 1964, and 1974. Less severe flooding took place in 1864, 1881, 1893 and 1903 (Atwood, Grey 1996). Another major flood occurred in 1997.

River flows were high enough during these major flood years to destroy bridges, roads, built improvements, mining structures, and to inundate agricultural lands and stream courses. No written record exists of flood impact on human improvements, soil vegetation, or aquatic life before Euro-American settlement and development, although certainly catastrophic one-hundred year floods occurred then, as in the recent past (Atwood, Grey 1996).

2. Droughts

Drought conditions were noted in 1841, 1864, 1869-74, 1882-85, 1889, 1892, 1902, 1905, 1910, 1914-17, 1928-35, 1946-47, 1949, 1959, 1967-68, 1985-1988, 1990-92, and 1994 (LaLande 1995). It is likely that many of the smaller streams in the area went dry during the drought years and the larger streams had low flows.

3. Dams

Ament Dam was built in the early 1900's at Pierce Riffle on the Rogue River. The purpose of the dam was for mining and irrigation. In 1919, Ament Dam was removed and replaced with Savage Rapids Dam in 1921. Savage Rapids Dam was raised in the 1950's to hold more water (110 years with Josephine). The dam has severely altered the natural flow regime of the Rogue River.

4. Mining Effects

Gold mining, both placer and hydraulic, began in the Grants Pass Watershed in the 1850's. Hydraulic "giants" used in mining were a familiar sight in the area during that time. Throughout the valley are signs of floating dredges which created small "lakes" when moved from one point to another (Sutton 1996). Hydraulic mining results in increased entrenchment, lower sinuosity, and increased sediment loads that fill pools with fine sediment (USDI-BLM, Applegate Star-Boaz WA 1997).

E. STREAM CHANNEL

Reports from 1845 and 1846 describe the Rogue River as being 100-yards wide (Pullen 1996). Historically, the steep, headwater streams in the Grants Pass Watershed had adequate amounts of coarse woody debris to create a step/pool assemblage. Forests along the streams provided shade to cool the streams and an abundant source of coarse woody debris resulting from tree mortality. The coarse woody debris provides both structure and nutrients for the stream. Commonly the lower reaches of the tributaries to the Rogue River within the Grants Pass Watershed were more sinuous than they are today and, therefore, they were more complex with more aquatic habitat available. This is especially true in areas of current development. Decreased sinuosity has resulted in decreased surface area of the streams allowing for decreased groundwater recharge.

Mining and road construction activities have increased the amount of sediment available in the stream system. Historically, there was more large wood in the system because of beavers and because wood was not taken out of the system by logging as it has been since European settlement. This wood is capable of trapping and storing sediment, and therefore, retaining more sediment in the system. The loss of beaver dams likely resulted in scouring of channel beds and banks, increased width/depth ratios and fine sediment deposition in pools (USDI-BLM, Applegate Star-Boaz WA 1997).

F. WATER QUALITY

Overall, prior to Euro-American settlement, historic summer water temperatures were likely lower than today due to lower width/depth ratios and more riparian vegetation. Given the fire occurrence prior to 1920 some stream reaches could have been sparsely vegetated for periods of time, resulting in higher water temperatures (USDI-BLM, Applegate Star-Boaz WA 1997)

Farming and mining resulted in a reduction in riparian vegetation allowing more solar radiation to reach the streams thereby increasing water temperatures. Irrigation withdrawals lower stream flows and increase the surface area of the water receiving solar radiation. This also increases water temperature.

Sediment loads and turbidity levels were historically lower due to fewer sediment sources prior to Euro-American influences. Sedimentation and turbidity rose dramatically in conjunction with hydraulic mining, land clearing and road building.

G. VEGETATION

Historical vegetation patterns or reference condition alludes to the forests or vegetation that existed on a site prior to significant Euro-American modification. Examples of significant Euro-American modification include clearing for settlement and agriculture, human development (homes, buildings, roads, etc.), timber harvesting, mining, grazing and fire suppression.

Information regarding this has been gathered from the O&C revestment notes. The inventories were done to determine several things: the economic worth of the land at that time, how much timber volume was present, and how the land should be used. Every 40-acre parcel of O&C land was surveyed. Although some of the notes were hard to comprehend, one may draw some conclusions of what the general landscape looked liked circa 1920.

Enough information is present in the old surveys to develop an approximate major plant series map. The information in the survey notes described the conifers present in both the overstory and understory, the amount of board feet present at that time, the major hardwood species (madrone, oak, etc.), the dominant brush species such as *Ceanothus* or manzanita, and whether or not there were any recent signs of fire events.

The data shown below summarizes the historic major plant series within the Grants Pass Watershed. This is shown to give an idea of past vegetation in the Grants Pass Watershed and does not represent exact acreage totals by series, mature/late-successional habitat, or for fire events. The board foot per acre totals are broken out showing percent of the Grants Pass Watershed with equal to or greater than 10,000 thousand board feet per acre. This is done for two reasons: 1) to show the amount of "high volume" acres in the Grants Pass Watershed in 1920 and, 2) to give an estimate of suitable habitat for late-successional dependent species present at that time. Ten thousand board feet per acre will be considered the low end for this type of habitat. Cruise data from the 1920 notes are based on different methods and standards. The yield is a conservative estimate by today's standards (Harris 1984).

Table IV-1: Historic Major Plant Series within the Grants Pass Watershed (1920)

Major Plant Series	No. of Acres Surveyed	Percent of Total Lands Surveyed	Number of Acres Burned	Percent by Series/ Watershed	Acres of Mature/Late-Successional Habitat	Percent by Series/ Watershed
Douglas-fir	3,800	17%	440	11%	120	60%
Jeffrey Pine*	97	0%	0	0%	0	0%
Non-Timber	7,120	33%	1,600	40%	0	0%
Ponderosa Pine	6,040	28%	1,040	26%	80	40%
White Oak	4,800	22%	920	23%	0	0%
Totals	**21,857**		**4,000**		**200**	

* Due to the unique nature of Jeffrey pine sites, the true acre figures for this series are considered to be lower than what truly exists. These sites may be represented in the revestment notes as Non-Timber or Ponderosa Pine. The 1996 inventory is a more accurate representation of the amount of land with the Jeffrey pine series present.

** Totals greater than 100% due to rounding up.

Major plant series is an aggregation of plant associations with the same climax species dominant(s). The Jeffrey pine series, for example, consists of plant associations in which Jeffrey pine is the climax dominant. It defines the potential natural vegetation that would exist on the site at the climax stage of plant succession, or the end point of succession where neither the plant composition nor stand structure changes. Net productivity in terms of biomass production is considered to be zero (Atzet and Wheeler 1984).

1. Landscape Patterns

Several conclusions can be made regarding the historic landscape vegetation patterns:

a. Fire events primarily took place at low elevations and warmer aspects in the northwest and southern portions of the watershed.

b. A majority of the Ponderosa pine series was in the areas that are now farm lands, urban and rural development. These sites occurred primarily in the west half of the watershed.

c. The Douglas-fir series occurs primarily in the Greens Creek, Savage Creek and Jones Creek subdrainages and at the upper elevations in the watershed. There was also some Douglas-fir found in the surrounding areas that are now farm lands, urban and rural development.

d. The Jeffrey pine series is situated on the northern boundary of the Grants Pass Watershed (35-5-32). This series is commonly found on southerly aspects at midslopes where the parent material is serpentine.

e. Plant series with infrequent high-intensity fires has a much higher percentage of mature/late-successional structure than those with a shorter fire return interval.

H. HUMAN USES

1. Cultural/Historical Use

Archeological evidence indicates that human occupation of southwest Oregon dates back about 10,000 years. During these prehistoric times the native inhabitants occupied southwest Oregon and minimally impacted the physical landscapes. The native inhabitants of the area are generalized as hunters and gatherers.

The first known whites to enter the Rogue Valley passed through in early 1827. They belonged to a party of Hudson's Bay Company trappers from Fort Vancouver under the leadership of Peter Skene Ogden. The Hudson Bay Company trappers continued to visit the area for several years. Other trappers and explorers made periodic visits to the area up to the time of the discovery of gold in Jackson County.

Gold was discovered on Jackson Creek (near present day Jacksonville) in the Rogue Valley in late 1851, or early 1852. Although gold was previously discovered elsewhere along the Applegate and Illinois Rivers, this gold discovery brought an influx of thousands of miners to the region.

As mentioned in the Characterization section, the land ownership pattern of the watershed was primarily molded in the late 1800's and early 1900's. The lands in the watershed in the mid-1800's were public lands owned by the United States and administered by the General Land Office. The first primary transfer of public lands out of ownership by the United States was to the State of Oregon following statehood in 1842.

In order to further develop the west, Congress passed several laws enabling settlers to development and obtain ownership of the public lands. These laws included Donation Land Claim patents, entry under the Homestead Acts, military patents, and mineral patents. In addition to these types of deeds, land was deeded to the Oregon and California (O&C) Railroad, with some of those lands being sold to private individuals. In reviewing the master title plats for the Grants Pass Watershed, it is apparent that ownerships of several of the low elevation lands were originally deeded from the United States to private individuals through the above Acts of Congress.

There is an old military road that dissects the watershed from the north paralleling existing interstate 5. This road was built in the 1850's. When the wagon road opened in 1860 the California Stage Company opened their route between Sacramento and Portland.

Early Native Americans used fire as a tool in order to clear heavy underbrush. Fire was used to clear transportation routes, chase game into traps, and clear areas for forage production. During the 1850's there were several Indian skirmishes in southwest Oregon. Fire was used to slow the pursuit of their enemies and to cover trails.

The Native Americans were primarily hunters and gatherers. The low elevation areas along the Rogue River were occupied by settlements with most of the gathering occurring in the oak woodlands near the transition zones. The Native Americans also took advantage of the plentiful fish available in the Rogue River.

Until 1914 the horse stage continued to serve as the primary method of transportation throughout Josephine County. The Croxton Stage Station was established in 1860 as the stage hub of Grants Pass.

The O&C Railroad was constructed into Josephine County in the early 1880's. The railroad connected with California four years later. The railroad enters the watershed at a location immediately west of Dollar Mountain in the northern portion of the watershed. The initial depot was built on 'G' Street in Grants Pass. The first train to arrive in Grants Pass from Portland was in 1883. Because of difficulties in the construction of the rail on the Siskiyou Summit, trains from California did not arrive until 1887.

In 1886 Grants Pass became the county seat. The county seat was previously in Kerbyville. The first county courthouse was built that year at a cost of $2,400.

Gold mining began within the watershed in the late 1800's. Since that time there has not been a great deal of mining within the watershed. However, there has been considerable prospecting and some small scale mining in the area of Mt. Baldy. In addition there has been mining on a larger scale at the Jewett Mine on the north face of Mt. Baldy. This mine includes seven patented claims. There was a five-stamp mill on site. The mine has not been worked since the 1900's.

Agriculture has been one of the leading businesses in Josephine County for the past century. Hops, peaches and beets were popular crops. The railroad helped to transport these commodities for shipment both within the United States and to foreign countries.

Timber mills were the largest industry of Josephine County. There have been several mills operating in Grants Pass over the last century. There have been several others that have operated in adjacent locations. The largest mills in Grants Pass were the Sugar Pine Lumber Mill and Grants Pass Plywood. At this time there are no large mills operating in Grants Pass.

2. Roads

As the West developed, what had previously been trails became narrow roads used to transport people and supplies. These roads were generally natural surface with the amount of sediment flow dependent upon use, location, weather conditions, and soil type. As the use of these roads increased over the years, the roads themselves changed in design. Many of today's highways began as trails and are now widened, realigned, and surfaced to meet the increase and change in vehicle traffic. Even with the increase in traffic flow, crushed rock surfacing, asphalt, modern techniques in road stabilization, and improved road drainage have actually decreased sedimentation and erosion along the original natural surfaced roads.

3. Recreation

Historically, recreation opportunities centered around the Rogue River. Activities included fishing, swimming and boating. Leisurely boat cruises upriver were taken above the old 1892 power dam, located downriver from Grants Pass. Fishing in the Rogue River has undergone startling changes in the last 70 years. Rowboats for pleasure and incidental fishing were practically unknown in those older days. Popular fishing spots included the south pier of the railroad bridge, the White Rocks and the Rock Crusher spawning riffle (Booth 1984).

The 1930's brought about the Civilian Conservation Corps, which, along with other duties, was responsible for building roads. These new roads provided recreation opportunities that were not previously accessible to many people. People began using roads to access sites for hiking, camping and driving for pleasure. Other recreational activities included camping, hunting, horseback riding, and cross-country skiing.

Urban recreation activities included dances, rodeos, parades, barbecues, potlucks and baseball. In 1926, a new 9-hole golf course was completed near Grants Pass to round out the summer recreation offerings (Sutton 1966).

I. FIRE

The historical fire regime of the Grants Pass Watershed was dominated by a low-severity regime. The low-severity fire regime is characterized by frequent (1-25 years) fires of low intensity (Agee 1990). Fires in a low-severity regime are generally associated with ecosystem stability, as the system is more stable in the presence of fire than in its absence (Agee 1990). Frequent, low-severity fires keep sites open so that they are less likely to burn intensely even under severe fire weather. Limited overstory mortality occurs. The majority of the dominant overstory trees are adapted to resist low-intensity fires because of thick bark developed at an early age. Structural effects of these fires are on the smaller understory trees and shrubs. These are periodically removed or thinned by the low-intensity fire along with down woody fuels. The understory density was low, open, and "park-like" in appearance. Areas of grasslands, grass/shrub, and oak savanna plant communities were more prevalent. These were maintained by the frequent fire which prevented encroachment by conifer tree species.

With the advent of fire suppression/exclusion 70-80 years ago, the pattern of frequent low-intensity fire ended. Dead and down fuel and understory vegetation are no longer periodically removed. Species composition changes and thinner bark, less fire resistant species increase in numbers and site occupancy. Grasslands and oak savanna are encroached upon by tree and shrub species. Shrub lands increase in density and cover. This created a trend toward an ever increasing buildup in the amounts of live and dead fuel. The understory of stands becomes dense and "choked" with conifer and hardwood reproduction. The longer interval between fire occurrence allows both live and dead fuel to build up. This creates higher intensity, stand replacement fires rather than the historical low-intensity ground fire that maintained stands.

I. Social Concern - Air Quality

Poor air quality due to natural and prescribed (human) fire has been a historical occurrence in the spring, summer and fall seasons for southwest Oregon. Numerous references are made by early Euro-American explorers and settlers to Native American burning and wildfire occurrence in southern Oregon. Smoke-filled sky and valleys were once typical during the warm seasons. Air quality impacts from natural and prescribed fire declined with active fire suppression and the decline in settlement and mining related burning. Factors influencing air quality shifted away from wildfire and human burning to fossil fuel combustion as population and industry grew. This created a shift in the season of air quality concern to the winter months when stable air and poor ventilation occurs. By the 1970's, fossil fuel emissions became the major factor along with wood stove and "backyard" burning. Prescribed burning related to the forest industry increased throughout this period and was an additional factor, particularly in the fall season. Regulation of prescribed burning smoke emissions and environmental regulation of fossil fuel combustion sources has lead to a steady improvement in air quality since the 1970's.

Air quality as a reference condition is determined by legal statutes. The Clean Air Act and the Oregon State Air Quality Implementation Plan have set goals and objectives. Management actions must conform so that effort is made to meet National Ambient Air Quality Standards, Prevention of Significant Deterioration, and the Oregon Visibility Protection Plan and Smoke Management Plan goals.

J. SPECIES AND HABITATS

1. Terrestrial

a. Botanical

(1) Special Status Plants

It can be postulated that the habitat for late-successional special status species (*Cypripedium* sps. and *Allotropa virgata)* was more extensive in the watershed before timber harvesting became common. Even though vegetation condition classes with larger trees do exist in the watershed today, it is impossible to know which pre-settlement habitats harbored orchid populations and how extensive they were in the past. The micro-habitat required was most likely more abundant and contiguous with frequent, low-intensity fires helping to maintain a competitive edge for these species in the herbaceous layer. Due to the complex life history of these plants, they were probably never a dominant species in the herbaceous layer. However, they may have occurred more frequently in the watershed and with higher numbers of plants per population area as moist, shaded microsite conditions occurred more frequently.

Valley habitats were much more prevalent than currently exist since the majority of settlement has occurred in these lowlands. More openings probably existed since fire frequencies were higher than currently. It's hard to imagine the extent and diversity that must have existed before highways, developments, golf courses and shopping areas fragmented these habitats. *Plagiobothyrus figuratus ssp. corallocarpus* was most likely more prevalent since wetland areas were less impacted from development and domestic water withdrawal. Noxious weeds were non-existent before the advent of European settlers.

b. Wildlife

(1) Introduction

A pre-European/Asian depiction of the Grants Pass Watershed would be dramatically different than one would see today. Native Americans were managing the landscape for habitats and products they found useful. Fires were used to burn off undesirable vegetation, and to promote growth of desired products. Wildlife was extensively used by these people to meet their everyday needs. Human exploitations of these wildlife resources were at a sustainable level. Each species maintained its role in an intricate food chain, where their presence benefitted the community as a whole. Large predator species such as grizzly bear, and wolves *(Canis lupus)* were present in the watershed (Bailey 1936) and, along with cougar *(Felis concolor)* and black bear *(Ursus americanus)* maintained the balance of species such as Roosevelt elk *(Cervus elaphus)* and blacktailed deer *(Odocoileus hemionus)*. Predator species kept herbaceous species in balance with vegetation. Predator species also benefit other community members like ground nesting birds. They harvested small mammals such as raccoons *(Procyon lotor)* that fed on the young birds. Predators also made carcasses available in the winter that benefit species as diverse as the striped skunk *(Mephitis mephitis)* and the black-capped chickadee *(Parus atricapillus)*.

The landscape was open and the movement of animals was unrestricted. Many animals would migrate with the seasons to take advantage of food, shelter and water. Black bears in the early spring sought green grass to activate their digestive system. Winter kills that remained around were utilized by the bears at this time. During early summer California ground-cone *(Boschniakia spp.)* became an important part of their diet until berries were available. As fall approached, the salmon returned to the river, spawned and died. This abundant food source was available to a host of consumers and scavengers. Deer and elk also followed the seasons. Winter was primarily spent in the oak/savannahs. As the seasons progressed they would enter the uplands until fall arrived. Other species such as the wolverine *(Gulo gulo luteus)* remained at high elevation throughout the year. This species was an opportunistic predator, feeding on animals such as porcupines *(Erithizon dorsatum)* and occasional winter kills.

Historically, the valley floor was dominated by an open stand of large conifers and oak/madrone/grasslands kept free of brush due to fire. Photos taken in the mid-1880's show the eastern and the western portion of the valley was dominated by mature stands of pine. The valley floor in the western half of the watershed appears to have been dominated by a mixture of oak and pine, and appears to have more open. Maps produced in 1856 through 1894 by the General Land Office characterize this area as "gently rolling country with open Pine, Oak, Fir and Cedar timber." This habitat provided nesting areas for various species, mast crops of acorns for wildlife forage, and big game winter range. A variety of bird species such as the acorn woodpecker *(Melanerpes formicivorus)*, western blue birds *(Sialia mexicana)* and Lewis' woodpeckers *(Melanerpes lewis)* were intricately tied to these stands. Species such as the sharptailed snake *(Contia* *tenuis)*, the common kingsnake *(Lampropeltis getulus)*, and the mountain kingsnake *(Lampropeltis zonata)* used the grassland-riparian interface area as their primary habitat. The open condition and the grass were highly beneficial to a number of game animals, and ground nesting birds. Deer and elk used this area for winter range. In turn, game animals provided sustenance for a host of predators species. Grey foxes *(Urocyon cinereoargenteus)* used the valley, and nearby brushy slopes as their primary habitat.

The area found above the valley floor was dominated by conifers. Stages of stand development varied due to disturbance events such as fire. Forests found on north and east facing slopes were generally multi-canopied, with large amounts of snags, down wood, and large trees. South and west facing aspects were composed of stands with a higher fire return interval, and were often devoid of large amounts of down woody material. The amount of old-growth forest historically found in the watershed varied through time in response to disturbance events. Old growth/mature forest was the dominant forest type in southwestern Oregon prior to European settlement, ranging as high as 71% (Ripple 1994).

Species that benefitted from these forests such as the pileated woodpeckers *(Dryocopus pileatus)*, northern flying squirrels *(Glaucomys sabrinus)* and red tree voles *(Phenacomys longicaudus)* were found in greater numbers than they are now. Dispersal of animals, recolonization of former habitats, and pioneering into unoccupied territories, was accomplished more effectively than it is today due to the connectivity of the older forest. Ripple (1994) estimated that 89% of the forest in the large-size class was in one large connected patch extending throughout most of western Oregon. Due to the connectiveness of mature habitat, species that benefitted from edge environments like striped skunks *(Mephitis mephitis)*, were less common than they are today.

Snags were more numerous than they are today and species that use snags for their primary habitat were more common. Numerous disturbance events such as fire, windthrow, and insect infestations played an important role in snag production. Due to the increased habitat, species that use snags were more common than they are today. Species such as the northern pygmy owl *(Glaucidium gnoma)*, western screech owl *(Otus asio)*, and northern flicker *(Colaptes auratus)* had more habitat than what is currently available.

(2) Riparian

Prior to the settlement of the valley, pristine streams flowed from their source to the Rogue River. Water quality was extremely high. Seeps, springs, and snow all contributed to keeping the water cool. During the winter and spring occasional floods would flush the system clear of sediment deposited from natural slides and erosion. Stream courses in the uplands were primarily lined by conifers with a narrow band of deciduous trees. These streams were generally well defined by entrenched channels. As the stream dropped to the valley floor, wide floodplains developed and the streams begin to meander taking on a variety of courses from year to year. These highly-sinuous stream systems consisted of undercut banks, oxbows, and woody material that created a diverse aquatic system and associated habitats. Here the riparian zone would have widened, with deciduous trees playing a more important role than they did in the uplands. Due to higher humidity, conifers near the streams resisted burning, allowing them to mature, resulting in heavy loading of large woody debris in the water. Adding to the diversity was a myriad of wildlife species. Beavers *(Castor canadensis)* acted as a keystone species, creating backwater sloughs behind their dams, and adding finer woody material to the stream. This fine material benefitted fish providing them with cover. Species such as ducks and geese also benefitted from the creation of ponds that provide nesting habitat. The diversity of wildlife species was not restricted to the surface as a profusion of aquatic insects took advantage of the variety of available niches. These insects in turn supported an assortment of vertebrate species including anadromous fish. As the adult fish returned to their native streams, their carcasses would produce a rich source of food that, in turn, supported minks *(Mustela vision)*, American black bears *(Ursus americanus)*, grizzly bears, bald eagles *(Haliaeetus leucocephalus)* and a number of other scavenger species.

2. Aquatic Habitats/Fisheries

Historically, the Grants Pass watershed area streams' health were much higher than its current condition, as past watershed activities have significantly reduced salmonid production and survival rates.

Salmonid production was historically much higher than currently exists. Steelhead and coho salmon populations were much higher, as a result of the high quality and quantity of spawning gravels. Gravels were clean, and not buried under silt. While the occasional natural landslide may have added some sediment, there was no constant sediment delivery to streams by roads, mining, or logging. Additionally, fish were distributed further up the streams since there were no culverts blocking upstream migration.

Salmonid survival rates were much higher prior to the arrival of European settlers. Old-growth riparian areas produced large coarse woody debris. Once stream bound, these key pieces of wood provided winter refugia for salmonids by diffusing high peak flows. In addition the wood created alcoves and side channels used by young coho salmon. Also, the large key pieces of wood hold back spawning gravels, other pieces of wood which collect detritus and other sources of nutrients for aquatic invertebrates. There was probably a wide abundance, and variety of insect groups including intolerant species requiring high water quality. The streams were not channelized by urbanization or roads and consequently had greater stream meander and floodplain connectivity. These factors also helped limit the impacts of high peak flows. The dense, closed canopy of the riparian area helped maintain cool stream temperatures, even during the summer. Summer flows were sufficient to provide adequate juvenile salmon, steelhead, and cutthroat trout rearing habitat. Higher stream flows additionally limited elevated summer temperatures.

Beavers (*Castor canadensis*) were likely found throughout the Grants Pass watershed area streams. They contributed to the amount of instream large woody debris, and created slackwater pools used by juvenile coho salmon. Additionally, the wooden dams created by *C. Canadensis* helped diffuse high flood events, acting as winter and summer refugia and increasing salmonid survival rates.

V. SYNTHESIS AND INTERPRETATION

A. PURPOSE

The purpose of the Synthesis and Interpretation chapter is to compare existing and reference conditions of specific ecosystem elements, to explain significant differences, similarities or trends and their causes, and to identify the capability of the system to achieve key management plan objectives.

Each section below contains discussions by core topic. Within each section there will be a discussion of changes and trends relating to the core topics, focusing on the key issues identified for the watershed. General discussion will be found in some sections, however, the discussion will focus on specifics of each change or trend in other sections. For instance, the Human Use section may discuss the changing transportation systems in the watershed. However, in the Species and Habitat section there may be a discussion of how this change has effectively introduced undesired plant species into the watershed.

B. EROSION PROCESSES

The major changes between historical reference conditions and current conditions are due to an increase in intensity and type of human interaction with the environment. Native peoples' burning practices were limited to valley bottoms, gently sloping footslopes and isolated upland meadows. The fires were spotty. This contrasts strongly with forest management that has occurred since the turn of the century.

Both on private and public lands, intensive forest management has included fire suppression, extensive road construction, and heavy logging with yarders on steep slopes and tractors on gentle to moderate slopes. Fire suppression has resulted in accumulation of fuels. A high-intensity fire consumes the duff, litter and most of the coarse woody debris. The top layer of mineral soil if impacted by a high-intensity fire commonly shows color changes due to consumption of organic matter and effects of heat on the mineral components. Without the organic fraction in the topsoil the soil looses natural glues that help form soil structure. This results in a condition that is much more susceptible to erosion.

The addition of forest roads has created avenues of concentrated flow that did not previously exist. This creates added surface runoff energy that erodes soils, especially granitic soils. This erosion phenomenon is in addition to natural soil erosion processes.

Human use on other developed land has increased overall erosion, especially on granitic soils (see Map 20, Siskiyou-Tethrick). As described above, erosion rates increase as additional sources of concentrated surface flow create more energy to detach soil particles. Intensively developed lands commonly have 100% runoff (no infiltration surfaces) due to such things as paved roads, parking lots and roofs. These features are not part of the reference condition. Added flow and sediment over reference conditions reach streams (see Hydrology and Water Quality below).

C. HYDROLOGY

The stream flow regime in the Grants Pass Watershed reflects human influences that have occurred since European settlers arrived. Changes in the stream flow regime due to human disturbance have not been quantified in the Grants Pass Watershed. Potential changes may include channel widening, bank erosion, channel scouring and increased sediment loads.

Urban development, agricultural practices, road construction, timber harvest and fire suppression are the major factors having the potential to adversely affect the timing and magnitude of stream flows in the Grants Pass Watershed. Urban development, agricultural development, extensive road building and timber harvest have most likely increased the magnitude and frequency of peak flows in the tributaries of the Rogue. As vegetation in the harvested areas recover, the increases in magnitude and frequency of peak flows will diminish. However, 100% runoff surfaces such as parking lots, roofs and permanent road systems will not allow the stream flow to return to pre-disturbance levels.

D. WATER QUALITY

Changes in water quality and temperatures from reference to current conditions that can stress aquatic life are predominantly caused by riparian vegetation removal, water withdrawals and roads. Water quality parameters known to be affected the most by human disturbances are temperature, sediment and turbidity. Road maintenance/road decommissioning and erosion control practices at development sites would decrease sedimentation in the analysis area.

The recovery of riparian vegetation that will provide shade should bring about the reduction of stream temperatures. Road maintenance/decommissioning and erosion control practices at development sites would decrease sedimentation in the analysis area.

E. STREAM CHANNEL

Channel conditions and sediment transport processes in the Grants Pass Watershed have changed since Euro-American settlers arrived in the 1830's primarily due to urban and rural development, road building and removal of riparian vegetation. Stream straightening and removal of riparian vegetation has resulted in entrenched channels with greater width/depth ratios. Increased instream gradients and sediment transport typically are a consequence of the larger width/depth ratios.

Sediment is mainly transported from natural surface road surfaces, fill slopes and ditchlines. Increases in sediment loads are generally highest during a five-year period after construction, however, they continue to supply sediment to streams as long as they exist. Road maintenance and decommissioning would reduce the amount of sediment moving from the roads to the streams. Roads constructed adjacent to stream channels tend to confine the stream and restrict the natural tendency of streams to move laterally. This can lead to down cutting of the streambed and bank erosion. Obliteration of streamside roads would improve the situation.

Removal of riparian vegetation has had a major detrimental effect on the presence of large woody debris in the stream channels. There is a minimal amount of large woody debris in the analysis area with many areas lacking the potential for short-term future recruitment. Large woody debris is essential for reducing stream velocities during peak flows and for trapping and slowing the movement of sediment and organic matter through the stream system. It also provides more diverse aquatic habitats. On BLM land riparian reserves along intermittent, perennial non-fish-bearing, and fish-bearing streams will provide a long-term source of large woody debris recruitment for streams on federal land once the vegetation has been restored. On other developed land the natural functions of stream channels and related floodplains should be recognized and respected in development plans in order to maintain water quality and hydrologic characteristics.

F. VEGETATION

Trends in vegetation in the Grants Pass Watershed include increasing densities of trees and shrubs within stands and a shift from historically dominant species to species that were historically a lesser component of the landscape or found primarily in the understory. Ponderosa and sugar pine and white oak were more prevalent while Douglas-fir was less common than it is today.

The existing vegetation conditions in the watershed today are a result of fire exclusion and replacing the natural disturbance pattern with human disturbances such as logging (particularly of the high-value pine species), farming and rural development.

Existing vegetation composition and pattern generates two areas of concern:

1) Fire exclusion has resulted in many of the forests in the watershed reaching densities of trees and shrubs that are not sustainable over time. In addition, fire exclusion has shifted Douglas-fir onto what were formerly Ponderosa pine and white oak sites.

2) Past harvest patterns in the watershed have resulted in removal of economically and biologically valuable tree species such as Ponderosa and sugar pine.

The vegetative and structural conditions of the forests in the watershed have seldom been constant and have changed frequently with historic disturbance patterns. Disturbance has played a vital role in providing for a diversity of plant series, seral stages and their distributions, both spatially and temporally. The presence of fire, insects, disease, periods of drought and the resultant tree mortality have always been components of ecosystem processes and occurred within a range of natural conditions.

Maintaining vegetative diversity and densities that are sustainable over time are important terrestrial and riparian ecosystem processes. These mechanisms have been impacted by the shift from primarily frequent, low-intensity fire to settlement-related disturbances and fire exclusion. When forest density, species composition, structure (variety of tree sizes, presence of snags and large down logs, etc.), populations of insects, presence of disease, incidence of fire events of varying intensities, and tree mortality occur outside the range of natural conditions, components of the ecosystem process are impacted. This is the current trend for the Grants Pass Watershed.

The previous timber harvest patterns in the watershed have tended to simplify forest structures while the increase in fire exclusion has driven forest structure towards a higher level of complexity. This is happening particularly on sites where it is not sustainable, such as those areas that historically supported the Ponderosa pine and white oak series. Plant communities within these two series have consequently developed another tree component, primarily Douglas-fir. Depending on the stage of stand development, this influx of Douglas-fir onto sites where historically fire events had kept Douglas-fir stocking low has added to stand complexity by providing another canopy layer beyond what would occur without fire exclusion. This additional canopy can modify the environment by providing additional shading and structure.

A high percentage of the BLM ownership in the watershed (46%) exists in small (5-11 inch DBH) and large (11-21 inch DBH) pole size classes and hardwood dominated lowsite lands (34%). Fire exclusion this century has permitted dense pole stands to develop over much of the watershed, crowding out important mid-seral species less tolerant to shade such as Ponderosa and sugar pine, Pacific madrone, California black oak and Oregon white oak. Stands consisting of dense poles or of small diameter are more vulnerable to stand replacement wildfire.

When forests remain at unsustainably high densities for too long, a number of trends begin to occur that effect stand health. Species composition, relative density, percent live crown ratio, and radial growth are all indicators of how forests are responding to environmental stresses.

Species such as Ponderosa, Jeffrey, and sugar pine, California black oak, Oregon white oak, Douglas-fir and Pacific madrone have historically been important components of the forests in the Jumpoff Joe Watershed. Except for Douglas-fir, they require the less dense, more open canopy conditions that were more prevalent in the forests of the watershed prior to fire exclusion. As stand densities increase beyond the range of natural conditions, these species drop out and the forests become dominated by Douglas-fir.

On BLM lands, the Douglas-fir series has increased from approximately 17% of BLM lands in 1920 to 52% today. A decrease in non-forest (33% to 1%) and Jeffrey/Ponderosa pine (28% to 21%) is shown over the same time period. The total percent decrease in those species requiring more open stand conditions associated with frequent, low-intensity fire (39%), is close to the increase in Douglas-fir (35%). Non-forest in 1920 was described by no timber volume listed on the inventory sheets. 1996 inventory data describes non-forest as non-vegetated, non-forest, and grass. The correlation is a rough one but useful for our purposes.

The amount of the federal forest land in the watershed that currently exists in a late-successional condition is approximately 1,874 acres (15%). The percentage that existed in a mature condition in the reference condition is estimated to be less than 1%. The increase in acreage is due to sites that were classified as non-timber or were the Ponderosa pine or white oak series and now have Douglas-fir filling in which added an additional structural component. This component was not present previously due to the shorter interval between fire disturbances. Repeated low-intensity fires did not allow for the establishment of Douglas-fir at the rate now seen in the watershed.

Late-successional forest for the 1920 surveys is defined as any parcels that exceeded 10,000 board feet per acre in conifers. There would have been more volume if 1996 volume criteria was applied. For example, in 1916 conifers were cruised only if they were at least 16 inches in diameter and only to a 12-inch top. Anything less than 16 inches in diameter was considered a pole and not counted as volume. Today's methods of cruising counts any conifers greater than seven inches in diameter and cruises all trees to a five-inch top. Consequently, by today's standards there was more volume present than listed in the revestment notes. Added to this is a hardwood component which provides structure and canopy layering. For this reason, the 10,000 MBF criteria is used. Even at this level, the Grants Pass Watershed only had less than 1% of the surveyed acres in a late-successional condition.

Based on comments in the revestment notes, by 1920 the area around Grants Pass had already had considerable Euro-American impact. Some of the notes indicated that by 1920 the parcels in the vicinity of town had already been logged. For this reason, the 15% figure quoted above should be considered a minimal level for mid/late-successional acres and prior to settlement (pre-1850), additional acres of this type of forest probably existed.

Percent live crown ratio and radial growth are physiological indicators of the trees' abilities to produce food and defensive compounds. Healthy live crowns are essential for healthy trees. When the average live crown ratios of forests drop much below 33%, the canopy's ability to support vital processes in the tree becomes diminished. Live crown ratios begin to recede (foliage on lower branches dies due to shading) as forests remain in an over-dense condition for too long. When live crown ratios are reduced too far, trees are unable to quickly respond to the release provided by density management thinning. Partial cutting management prescriptions may no longer be a forest management option.

The capability of the ecosystem to restore the Grants Pass watershed's vegetation to natural conditions, as we understand them, using natural processes would be through fire, insect, disease or other types of disturbance events that create growing space. These processes would lower densities and clear out competing understory vegetation.

Fire is the primary process that would lower densities and clear out competing understory vegetation. In the absence of fire, insects and disease often become the processes that reduce stand density. Because of densities in the forest stands (live fuels) in the Grants Pass Watershed, the buildup of dead and down fuels, the checkerboard ownership of private and government lands and the rural residential interface, it is impossible to allow the natural fire regime to control forest densities at this time. At the present time, a naturally occurring fire, such as caused by lightning, would have a high potential to be intense stand replacement fires and threaten human lives and property.

Additional analysis of current vegetative conditions will be necessary to prescribe forest management activities. Plant series data needs to be combined with vegetative condition class to determine management opportunities. For example, information on the amount of acres in the Douglas-fir series is available as is information on the amount of pole stands but not Douglas-fir pole stands. A second example could be acres of Ponderosa pine and white oak being encroached upon by Douglas-fir that require restoration treatments.

Present indications are that the watershed will require extensive density management (thinning) in both natural and planted stands. General objectives for the thinning include reduction of the total number of stems, species selection to provide a species mix that more closely resembles that which was thought to occur prior to fire exclusion and logging, and fuels management (prescribed fire) to reduce the activity fuels (slash) created via the density management.

G. HUMAN USE

Significant changes that have occurred in the watershed include: More roads throughout the area, some of which were constructed because of BLM timber sales to access and manage BLM lands. Many other roads were constructed on private land to access and develop properties. Grants Pass and the surrounding areas are increasing in population due to the influx of out-of-state individuals purchasing property. With this increase in population and access has come an increased use of public lands. The type of recreational use is also changing from non-motorized to motorized (before roads, there were mainly trails which accessed the area). In the past 10 years, there has been less federal timber cutting and more private timber cutting. Due to the increase in population and access, as well as an increase in landfill fees, there has been an increase in the illegal use of the watershed such as refuse dumping to living on BLM land to firewood cutting and collection.

Settlement patterns in the watershed have historically centered around the City of Grants Pass. When the railroad was built the City of Grants Pass grew around it. The city became a hub of the region offering services and industry tailored to the timber and agricultural industries. As the city grew so did the number of rural residential occupants. Contributing to the growth of the area was the fact that major north to south highways (Highway 99 and Interstate 5) are located through the watershed.

Human use has lead to increased overall erosion especially in granitic soils (see Map 20)(Siskiyou-Tethrick) and altered water quality and quantity in the Grants Pass Watershed. Erosion and sedimentation is due to additions of increased runoff from roads, parking lots, roofs and other surfaces where there is no or little infiltration. Agricultural and forest management practices have also caused erosion and sedimentation. Stream channelizing has created destabilized stream channels with increased bank erosion and, therefore, added sediments to streams. Clearing of riparian vegetation in developed areas has created increased water surface exposure to sunlight which results in increased summer stream temperatures.

The anticipated result of these social or demographic changes/trends that could have ecosystem management implications include an increase in population which increases the demand for use (or abuse) of public lands, a continuation of the illegal use of the watershed due to lack of law enforcement patrol, and landfill fee increases.

H. FIRE MANAGEMENT

1. Fire Regime

A major difference between existing and reference condition is the change in the fire regime. The watershed has gone from a low-severity to a high-severity fire regime. Previously, fire has occurred frequently and burned with low intensity, and functioned largely in maintaining the existing vegetation. Both live and dead fuels were generally in a low hazard condition. High hazard fuel accumulation was localized and not a predominate condition. Currently, fire is infrequent, burns with high intensity, and causes high degrees of mortality, replacing vegetation rather then maintaining it. This has resulted from nearly a century of fire suppression and exclusion. The change in vegetation conditions, fuel profile, and amount of fuel present is now such that the impacts from a large wildfire will produce severe effects on vegetation, erosion, habitat, and water quality. Stand replacement from wildfire impact was a low percentage in the reference condition. Existing conditions will produce 50% to 75% stand replacement today. The Sykes, Salvage, and Nine Mile Fire Complex of 1987 is an example of the effect that can be expected at this time and in the future. The current trend is for increasing fuel hazard build up and increasing risk for fire ignition due to population growth and human use within the watershed and adjacent region.

The magnitude of this change is widespread throughout the entire watershed. Only 3% of the watershed is currently in a low hazard condition. High hazard conditions occur throughout the watershed and cover 57% of the area. Vegetation in the watershed is at a high degree of risk for mortality and stand replacement from wildfire. The existing and future trend in fuel and vegetation conditions is the predominant factor that will adversely effect the ability to achieve most management objectives for the watershed. The capability of the watershed to achieve and meet management objectives is low in the long term (20-years plus).

If vegetation in the Grants Pass Watershed is left without treatment fire hazard and risk will increase (see Map 18). Risk of an extensive hot fire correlates directly to risk of loss of vegetative cover and litter/duff which would result in increased erosion, stream sediments, and a loss of soil productivity. An extensive hot burn would also cause an increase in peak stream flows due to increased open areas this could in turn affect stream channel stability (see Soil Erosion Processes, Hydrology, Water Quality, and Stream Channel sections).

2. Plant and Wildlife Species

Historical fire, both prescribed (Native American) and wild, played a crucial role in maintaining a mosaic of habitat types in the watershed. Deer winter range was burned, meadows were maintained and oak and pine sites remained free of Douglas-fir encroachment. With the advent of fire exclusion, many of these sites were altered due to plant succession. Species diversity was reduced due to competition in the herbaceous layer.

The subsequent accumulation of fuels and shift to less fire tolerant plant species has increased the potential of high-intensity fire in the watershed. This in turn threatens species diversity and special status plants in the watershed.

3. Air Quality

Air quality in the watershed has improved dramatically within the past decade. Smoke impacts from forest management prescribed burning has never been a major source of pollution and is presently a negligible source. Future increases in the use of prescribed fire are expected. Burning would be conducted within the guidelines of the Oregon Smoke Management Plan. Potential for an increase in impacts to air quality would be possible. This might result in one to several days of increased PM10 within the Grants Pass valley given an unforseen weather event trapping smoke from prescribed burns. Measures such as rapid mop-up would be taken to reduce the amount of smoke. This potential increase is an acceptable tradeoff when compared to the devastating impacts created from large wildfires. The fires in 1987 created unhealthy air quality for almost 30 days in a row that fall.

4. Rural Interface and Urban Growth Boundary

The fire disturbance process is altered through increased urbanization. Increased human settlement leads to the exclusion of wildfire and prescribed fire use. Reduction in the occurrence of this disturbance process creates changes in the fuel and vegetation profiles which shift fire regimes to less frequent, but higher-severity wildfire occurrence. As human development increases, alteration of natural landscapes occurs through changes in land use. Roads, buildings and parks replace "natural" features. During early stages of urbanization the risk of wildfire increases dramatically. Fires are numerous and can be large and destructive. Fire risk and occurrence declines as development fragments, reduces, and isolates areas with flammable vegetation. Highly-urbanized areas no longer have sizable landscapes capable of sustaining large wildfires occurrence.

The Grants Pass Watershed currently still retains many areas of lands that remain in conditions that support large wildfire occurrence. Urban growth for the next decade will not reach the extent that the threat of large catastrophic fire would be removed. The majority of the watershed has areas interspersed with human residential sites. Wildfire occurrence potential remains high, while the use of prescribed fire becomes increasingly unacceptable to adjacent residential landowners. The threat of wildfire is not always recognized by new landowners. The complexity and cost of implementing hazard reduction treatments increases. In the absence of hazard reduction treatments or intense urban development, the potential for catastrophic wildfire occurrence threatens all within the watershed.

I. SPECIES AND HABITATS

1. Terrestrial habitats

a. Botanical

(1) Special Status Plants

Differences between current and reference special status plant habitat conditions in the Grants Pass Watershed have occurred primarily from: 1) fragmentation of habitat due to development or timber harvest and, 2) changes in species composition due to fire suppression. Fragmentation of late-successional habitat required by *Cypripedium* species lends uncertainty to the long-term health of these species. As habitat continues to shrink, those populations in existence will become more isolated with little chance of expansion. This will also make them more susceptible to extirpation from chance events (such as a hot burning wildfire due to hazardous fuel levels) that could cause major perturbations in numbers of individuals per population and numbers of populations in the region (i.e., southwestern Oregon). As the number of individuals decreases, the number of populations decreases and their habitat is reduced, the chance of extirpation of these species from the region could occur.

The reason the *Cypripedium* species were included as Survey and Manage species was because their future viability was uncertain due to their dependence on late-successional habitat. The Late-Successional Reserves (LSRs) designated by the Northwest Forest Plan may not provide refuge for the majority of *Cyprepedium* populations in this region of Oregon. More survey work should be undertaken for a more thorough understanding within the LSRs. Currently, the majority of populations exist on matrix lands although this may merely be a reflection of surveys being focused in the Matrix.

Fragmentation of native valley habitats due to development has left BLM lands as the only areas left relatively untouched, but also unmanaged. This mixture of grasslands, wetlands, oak woodlands and schlerophyllous shrubland provides a unique biodiversity that has disappeared in the Grants Pass Watershed as well as others draining into the Rogue Valley. Due to lack of a natural fire regime these habitats will, however, continue to lose biodiversity unless an active management strategy is pursued. Grasslands are becoming overrun by noxious weeds, oak woodlands are becoming invaded by conifer species and shrublands are closing their canopies completely as succession continues unchecked by fire. Wetlands are being eliminated due to road development, housing development, off-highway vehicle impacts and agricultural practices. The special status plants associated with these wetlands, such as *Plagiobothyrus figuratus ssp. corallicarpus,* are quite rare due to this reduction in habitat. Protecting wetlands on BLM land is essential to the survival of these species. Managing to increase the health of these habitats using such techniques at prescribed fire is also essential.

The RMP includes management actions/directions that require the maintenance or enhancement of habitats such as these. Any treatment to these areas must consider the habitat requirements of the native species depending on them.

b. Wildlife

(1) Dominant Processes - Historic to Current Conditions

The settlement of the watershed and the subsequent division of land between the public and private ownership has limited the ability of the federal agencies to restore historic conditions in the watershed.

The checkerboard ownership pattern of the federally-managed land and the fragmentation and patch size of the remaining late-successional habitat will partially determine the ability of the watershed to support many species. This is particularly true for species with low dispersal capabilities such as the Del Norte salamander. In addition, the limited federal ownership of some plant communities precludes the recovery of some species of concern without the cooperation of private landowners. These habitats include native grasslands, oak savannahs, and anadromous fish-bearing streams (riparian habitat). In addition, the suppression of fire within the watershed has changed vegetation patterns and historic habitat distribution. Species dependent on fire-created habitats have been adversely impacted through fire suppression.

The majority of the species of concern are associated with late-successional habitat. Much of this habitat has been altered, both on private and federally-managed lands by timber harvest. Species associated with this habitat type have been adversely impacted through the conversion of older stands to younger stands. At the same time, species utilizing early seral habitat and edges have benefitted from this shift of older forest to younger forest. Timber harvest and road building has also led to increased sedimentation, increased stream temperatures, and decreased stream stability and structural diversity, which in turn negatively affects aquatic and semi-aquatic wildlife. Road building also negatively decreases the effectiveness to a number of habitats due to disturbance, and have further fragmented patches of late-successional forest.

Trend for habitats found on federally-administered public lands are determined by the Northwest Forest Plan. Broadly speaking the Grants Pass Watershed is composed of matrix land, riparian reserves, and five 100-acre spotted owl cores that function as Late-Successional Reserves. Matrix land comprises 96% of the BLM-managed land in the watershed. The majority of the timber production will occur on this land, with an overall trend towards younger forest with some old-growth components. The expected trend for the 100-acre spotted owl cores is the maintenance of late-successional forest habitat conditions. The success of the reestablishment of populations of old-growth species will be depend on habitat requirements of the species, dispersal capabilities, habitat condition in the watershed and ownership pattern.

Potential limiting factors for recovery of habitats of sensitive species exist in watershed including fire suppression and habitat fragmentation. Historically many habitats within the watershed were created and maintained by disturbance events, in particular fire. Fire, for the most part, has been excluded from the watershed for the last 80 years. Fire-created habitats and associated wildlife species have been negatively impacted from fire suppression. This is particularly true for oak/savannah and pine stands.

Habitat fragmentation occurs on the valley floor as well as the uplands. Habitats found along the valley floor have experienced severe fragmentation due to conversion to homesite. Due to habitat fragmentation, patch size and access for wildlife, many sites no longer function to their historic biological potential. Of particular concern is the remaining oak woodlands and Ponderosa pine sites. The loss of these habitat type will continue to contribute to the decline of associated species of wildlife. Tracts of public land are critical to the long-term retention of this habitat type and the biodiversity it supports in the lowland portions of the watershed.

Historically, the amount of old-growth forest found in the watershed was never stable and continually fluctuated through time. Forests are constantly developing towards their climax community while simultaneously being set back to earlier seral stages by disturbances. Historically, when large scale disturbances moved through the watershed the amount of old-growth would be low. As time passed the old-growth habitat would recover allowing species associated with this habitat to recolonize into the watershed. Colonization was aided by the higher population level of old-growth dependent species as well as the greater amounts of mature and old-growth forest that were historically present in the region. This larger amount of old-growth forest allowed for greater connectivity of habitat and easier dispersal of species associated with this habitat. Currently, the amount of fragmentation of old-growth habitat in the watershed is of particular concern from the perspective of old-growth forest associated species. Due to the checkerboard ownership pattern and past timber harvesting, the remaining mature and old-growth habitats are widely fragmented. Species dependent on older forest such as the American marten (*Martes americana*), the Fisher (*Martes pennanti*) and the northern spotted owl (*Strix occidentalis*) have limited habitat in the watershed. Many of the remaining older stands no longer serve as habitat for late-successional dependent species due to the amount of edge the stands contain which is increased by irregular shapes and small sizes. The edge to interior ratio effects how useful the stand is for late-successional forest species. Stands with a great deal of edge no longer provide effective interior forest conditions. The micro-climatic changes of the "edge effect" can be measured up to three tree lengths in the interior of the stand (Chen, *et al*, 1992).

Isolated patches of old-growth habitat may be too small to support the maximum diversity of species. In heavily fragmented environments, larger predators that naturally occur at low densities are lost first (Harris and Gallagher 1989). The California wolverine (*Gulo gulo luteus*) utilizes high elevation undisturbed habitat and their populations are declining due to fragmentation. Fragmented habitats lead to isolated populations of animals which lose genetic vigor, and is a serious threat to biological diversity (Wilcox and Murphy 1985). Intact old-growth corridors are critical for insuring gene pool flow, natural reintroduction and successful pioneering of species into unoccupied habitat. Animals disperse across the landscape for a number of reasons including food, cover, mates, refuge, and to locate unoccupied territories. The vast majority of animals must move during some stage of the life cycle (Harris and Gallagher 1989). Dispersal corridors function when they provide hiding and resting cover. Species that depend on late-successional forest are poor dispersers and more vulnerable to extinction in fragmented landscapes than species associated with early-successional stages (Noss 1992). This is particularly true for flightless species such as the Fisher (*Martes pennanti*). Fishers are reluctant to travel through areas lacking overhead cover (Maser, *et al*, 1981) and are at risk for genetic isolation. Species that are more mobile, such as the spotted owl, maybe capable of dispersing into isolated patches of habitat but run a higher risk of predation when crossing areas of unsuitable habitat.

Small patches of old-growth forest can provide important refugia for poor dispersers and species with small home ranges such as the Del Norte salamander (*Plethodon elongatus*), allowing for recolonization into surrounding areas if future conditions become more suitable. Isolated patches of old-growth also offer important refugia for a number of late-successional associated bryophytes, fungus, and other plants.

The high road density in the watershed are of concern due to their effects on habitats. The construction of roads contributes to the delivery of sediment into the aquatic system. Road building along streams has also led to increased channelization of the stream. Sediments can negatively effect fish by filling pools, embedding spawning gravel and smothering eggs. Roads also lead to increased disturbance, such as poaching and decrease habitat effectiveness. Increased disturbance to deer and elk increase their metabolic rate and decrease their reproductive success (Brown 1985). Roads also further fragment patches of old-growth forest creating "edge" which changes interior forest conditions and allows generalist species to compete with old-growth dependent species. Species such as the great horned owl (*Bufo virginianus*) utilize fragmented landscapes, and prey on Spotted owls.

(2) Expected Habitat Trends

The habitat trends for species of concern varies with ownership and plant community. In general habitats found on private lands have undergone the most significant change from historic conditions. Public lands management by the federal government have undergone less dramatic change but are notably different from conditions found in pre-settlement times. Expected trends on private lands are nearly impossible to gauge, but there is a tendency for short-term rotation on forest lands (60-80 years), and heavy use of most native grasslands, riparian and oak woodlands for agriculture and homesites. Native plant communities such as grasslands, pine stands, oak savannahs and old-growth forest, and their associated animal communities should be considered at risk on private lands. Expected habitat trend for each plant community can be found in the following narrative.

Riparian: The condition of the riparian habitat is dramatically different from pre-settlement conditions. Timber harvest, road building, water withdrawals and urbanization has led to a poor functioning stream system. Recovery of the aquatic biodiversity on public land is partially limited due to the condition of private land in the watershed. The majority of low gradient streams found in the watershed are under private ownership. These areas historically contained the best spawning habitat for fish. The expected trend for riparian habitat is to remain static or decrease in condition due to an in demand on resources. The quality of riparian habitat on federally-administered land should increase under the current forest plans. Cooperation between all parties within the watershed would be necessary to insure the continued viability of many fish and wildlife populations.

Pine Habitat: Maps produced in 1856-1894 by the General Land Office characterize portions of the valley floor as being dominated by oak and pine. Many of these stands have been lost on private land through timber harvest and conversion to homesite and agriculture. The majority of pine stands on public land have seen some form of timber management while other stands have been allowed to degrade due to fire suppression and the consequent encroachment of fire intolerant species. Expected trend for private land is for continued harvesting of this habitat on a short-term rotation bases. Pine habitat found on federally-administered matrix land will be to continue to be available for timber harvest except for habitat on lands withdrawn from the timber base which continue to degrade in quality until such time that a proactive management strategy is implemented.

Oak woodlands: Oak woodlands within the watershed are disappearing faster then they are regenerating themselves. The amount of this habitat type historically found in the watershed is unknown, but the current quantity of this habitat is thought to be a fraction of what historically occurred. The expected trend for oak woodlands on private lands is that it will remain static or decline. On federal lands the amount of oak woodland is expected to remain largely unmanaged. Natural disturbance such as fire has been reduced and many of these stands are in poor condition. Expected trend is for further habitat degradation until these problems can be addressed with a management strategy.

Old-Growth Forest: Little if any old-growth forest remains on private lands in the watershed. Due to short rotations of timber harvest on private land, no increase in old-growth forest on private land is expected. The quantity and quality of old-growth forest located on federal matrix land may well decline under the current forest plan.

(3) Species

The conservation of native biodiversity is limited by a number of factors including the availability of species to repopulate suitable habitat, land ownership, spatial relationship of the federal lands and habitat quantity and quality.

The extirpation of portions of the native fauna from an area alters how the remainder of the community functions. Native species play roles that benefit the community as a whole. Removal of one species may lead to a population imbalance in an another. Historically, wolves and grizzly bears served as a predators in the watershed. The act of predation played a critical role in the community. Prey remains not consumed by the wolf were available to a host of other animals. Deer and elk populations were kept in balance with the vegetation, and the community as a whole benefitted from the predation. When exotic species are introduced into a community the natural food chain is altered. An example of this is found with the largemouth bass (*Micropterus salmoides*). An introduced species, it has had deleterious effects on turtles, frogs and ducks.

Species known to be extirpated from the watershed include grizzly bear and wolf. Wolves have remained on the sensitive species list due to sightings of large canids within southwestern Oregon. Currently, Oregon is not included in the recovery plans for these two species. Species such as the wolverine that have remnant populations in the province may have the ability to recover themselves in this watershed. However, due to the checkerboard land ownership pattern the federal government has limited options to promote the remote habitat these species require.

Habitat quantity and quality is a critical factor determining the presence or absence of species in the watershed. Species with narrow habitat requirement such as late-successional forest dependent species will not maintain populations in areas void of older forest. The following table displays the expected habitat trend for species of concern (see page 52 for definition) in the Grants Pass Watershed. The projections are based on several considerations: The majority of federal land in the watershed is classified as matrix land, land where a primary objective is to produce timber and forest products. The general silvicultural prescriptions for the Southern Forest General Forest Management area is the retention of a minimum of 16-25 large trees per acre be left in all harvested units. This will result in the long run (50+ years) in a multi-age, multi-canopied forest. In the short run it is expected that mature trees will be harvested resulting in a decline of older forest in the watershed. Specific actions such as commercial thinning may possibly hasten the development of older forest in the watershed, which would be beneficial for the majority of the species of concern. But it is not expected that these forests will retain the snags, down wood, high canopy closure etc., necessary to allow for long-term maintenance of late-successional forest species on these lands. To conserve late-successional species, the NFP includes a late-successional forest retention standard and guide to maintain a minimum of 15% of federal forest lands in the watershed in as older forest condition.

Table V-1: Expected Federal Habitat Trends for Species of Concern

Common name	**Habitat**	**Expected Habitat Trend**
Gray wolf	Generalist, prefers remote tracts of land	Decrease in the watershed
White-footed vole	Riparian alder/ small streams	Increase in habitat as riparian areas recovers from past disturbance
Red tree vole	Mature conifer forest	Decrease in the watershed
California red tree vole	Mature conifer forest	Decrease in the watershed
Fisher	Mature conifer forest	Decrease in the watershed
California wolverine	Remote/High elevation forest	Decrease in the watershed
American marten	Mature conifer forest	Decrease in the watershed
Ringtail	Rocky bluffs, caves and mines	Possible decrease in habitat as hard rock mines/quarries reopen
Peregrine falcon	Remote rock bluffs	No nesting habitat available
Bald eagle	Riparian/Mature conifer forest	Possible increase as riparian areas recover from past disturbance, decrease on matrix lands
Northern spotted owl	Mature conifer forest	Decrease in the watershed
Northern goshawk	Mature conifer forest	Decrease in the watershed
Mountain quail	Generalist	Stable
Pileated woodpecker	Mature conifer forest/snags	Decrease in the watershed
Lewis' woodpecker	Oak woodlands	Decrease until management strategy developed for oak woodlands
White-headed woodpecker	High elevation mature conifer forest	Decrease in the watershed
Flammulated owl	Mature Ponderosa pine/mature Douglas-fir forest	Decrease in the watershed

Table V-1: Expected Federal Habitat Trends for Species of Concern

Common name	Habitat	Expected Habitat Trend
Purple martin	Forage in open areas near water/cavity nesters	Increase as riparian areas recover and forest mature
Great gray owl	Mature forest for nesting/meadows & open ground for foraging	Increase in foraging habitat, decrease in nesting habitat
Western bluebird	Meadows/Open areas	Decrease as clearcuts recover and meadows become encroached with trees
Acorn woodpecker	Oak woodlands	Decrease until management strategy developed
Tricolored blackbird	Riparian habitat/cattails	Stable/increase as riparian habitat recovers
Black-backed woodpecker	High elevation mature conifer forest	Decrease in the watershed
Northern pygmy owl	Conifer forest/snags	Decrease in the watershed
Grasshopper sparrow	Open savannah	Decrease until management strategy developed for savannah habitat
Bank swallow	Riparian	Increase as riparian habitat recovers
Townsend's big-eared bat	Mine adit/caves	Decrease as trees around caves/adits harvested
Fringed myotis	Rock crevices/snags	Decrease in the watershed
Silver-haired bat	Conifer forest	Decrease in the watershed
Yuma myotis	Large trees/snags	Decrease in the watershed
Long-eared myotis	Large trees/snags	Decrease in the watershed
Hairy-winged myotis	Large trees/snags	Decrease in the watershed
Pacific pallid bat	Large trees/snags/rock crevices	Decrease in the watershed
Western pond turtle	Riparian/Uplands	Decrease due to shore side development and introduction of exotic species
Del Norte salamander	Mature forest/talus slopes	Decrease in the watershed
Foothills yellow-legged frog	Riparian/Permanent flowing streams	Increase as riparian habitat recovers
Clouded salamander	Mature forest/snags/down logs	Decrease in the watershed
Southern torrent salamander (Variegated salamander)	Riparian/Cold permanent seeps/streams	Increase as riparian habitat recovers
Black salamander	Talus/Down logs	Decrease in the watershed
Sharptail snake	Valley bottom	Stable
Calif. Mtn. Kingsnake	Generalist	Stable
Common kingsnake	Generalist	Stable
Northern sagebrush lizard	Open brush stands	Stable

Table V-1: Expected Federal Habitat Trends for Species of Concern

Common name	Habitat	Expected Habitat Trend
Tailed frog	Riparian/Mature forest	Increase as riparian habitat recovers

2. Aquatic Habitats

a. Fisheries

There are numerous limiting factors which affect salmonid populations within the Grants Pass Watershed. Ocean productivity, commercial and recreational fishing, migration barriers, predation, and freshwater habitat. Large woody debris (LWD), riparian condition, sedimentation, stream flow, water temperature and fish barriers are key components of freshwater habitat. Sedimentation has limited fish production in Vannoy and Allen Creeks and they are no longer fish-bearing since the spawning gravels have been completely buried by sediment. Water withdrawals have limited salmonid distribution instream of the Grants Pass Watershed since most stream flow is subsurface in late summer.

Federal lands: The streams on federal lands continue to be a source of refugia for salmonid populations within the Grants Pass Watershed. Although LWD is limited in many streams, there is sufficient canopy cover to provide sources of cooler water. Macro invertebrate health will continue to improve on federal lands with the continued advancement of seral stages within the riparian reserves, the consequent habitat and environmental changes, and the increased supply of large wood.

Non-federal lands: Future urbanization on non-federal lands will continue to increase sedimentation, water temperatures, and to decrease the amount of large woody debris available to the streams and summer stream flow levels. These factors will continue to contribute to a decrease in fish populations. There is a poor probability for salmonid recovery due to poor habitat conditions on private land. Macroinvertebrate health will continue to decline as sediment increases and the future recruitment of large wood is compromised. The declining macroinvertebrate population will further limit the salmonid populations. Fish passage is currently a great problem in streams of the Grants Pass Watershed. The Grants Pass Irrigation District (GRID) maintains the irrigation system within the analysis area. Irrigation ditches impede downstream movement of juvenile salmonids as stream flows recede. Many streams in the Grants Pass Watershed run directly into irrigation ditches during the summer. In addition, the water intake from Savage Rapids Dam allows downstream migrating juvenile steelhead and coho salmon to be trapped within the irrigation ditches. There is little chance for stream restoration within the Grants Pass area since irrigation ditches block fish movement within the streams. In addition, sediment levels in several streams are currently too high. The high sediment levels are likely to remain in the streams as most of the systems are too short to produce winter flows high enough to clean the spawning gravels.

VI. MANAGEMENT RECOMMENDATIONS

A. PURPOSE

The purpose of this management recommendation section is to bring the results of the previous steps to conclusion by focusing on management recommendations that are responsive to watershed processes identified in the analysis. Recommendations also document logic flow through the analysis, linking issues and key questions from step 2 with the step 5 interpretation of ecosystem understandings. Recommendations also identify monitoring and research activities that are responsive to the issues and key questions and identify data gaps and limitations of the analysis *(Federal Guide for Watershed Analysis, Version 2.2, 1995)*.

B. RECOMMENDATIONS

Tables VI-1 through VI-4 list some management recommendations that will lead towards the desired future condition of the Grants Pass Watershed. These recommendations are grouped based on land allocation. They should all be viewed within the context of the NFP and the RMP and build upon the objectives and recommendations within these plans.

C. DATA GAPS

Data gaps are listed in Table VI-5. Filling the data gaps is important to support further analysis of the ecological process in the watershed.

Table VI-1: Management Recommendations (All Land Allocations)

Land Allocation	Issue/ Concern	Related Core Topic	Location	Recommendation
All	Special status survey & manage plants	Species and habitat (Botany)	Watershed wide	Survey entire watershed for special status Survey and Manage species; protect known sites during ground disturbing activities; institute management strategies to maintain/improve sensitive species habitat.
All	Deer winter range	Species and habitat (Wildlife)	Areas located below 2,000 feet	To minimize disturbance, employ the following where possible: seasonal road closures, reduce road densities by decommissioning roads, minimize new permanent road construction, restrict management activities between November 15 to April 1.
All	Valley habitat	Species and habitat (Wildlife)	Watershed wide	Whenever possible retain these sites in public ownership. If traded, consider the high biodiversity value of these sites before disposing of these lands and trade for "like" habitat.
All	Location of springs/seeps/ wetlands	Hydrology	Watershed wide	Inventory the watershed to locate springs/seeps/wetlands, implement management according to ROD/RMP.
All	Inventory	Hydrology, stream channel	Watershed wide	Pursue a comprehensive stream inventory and classification. Inventory all stream riparian areas for proper functioning condition. Use results in planning process.

Table VI-1: Management Recommendations (All Land Allocations)

Land Allocation	Issue/ Concern	Related Core Topic	Location	Recommendation
All	Road density, soil erosion	Erosion processes	West part of watershed/ areas with granitic soils	These areas should receive high priority for any proposed actions that reduce road density. These areas should receive high priority for road renovation / maintenance due to the highly-erodible granitic (Siskiyou) soils.
All	Private land	Species and habitat (Botany, Aquatic, Vegetation)	Private land	Work with non-federal landowners and land managers, help them identify and protect sensitive plants and their habitats. Work with private landowners to restore riparian and fish habitat and modify irrigation diversions that jeopardize juvenile fish passage. Accomplish this through working with watershed councils, partnerships, etc.
All	Meadows, oak groves, shrublands, Ponderosa pine sites	Species and habitat (Botany, Wildlife, Vegetation)	Watershed wide	Locate, survey and map areas identified in appendix and track development on non-federal lands. Protect and restore areas on federal lands by instituting a program of prescribed burning and mechanical treatments (thinning, brushing) to reduce density of early seral vegetation, slow encroachment and increase diversity. Based on the 1920 plant series maps, begin restoration (thinning, brushing and burning) of the Ponderosa pine and Oregon white oak. Encourage non-BLM land managers to do the same.
All	Noxious weeds	Species and habitat (Botany, Vegetation)	Watershed wide	Develop an active eradication program for noxious weeds in the watershed, especially in the native grasslands adjacent to agricultural and developed areas.
All (needs work)	Monitoring	All	Watershed wide	Implement monitoring as an aspect of all projects. Monitor soil erosion with a priority for granitic soil areas. Gather baseline and trend information/data regarding distribution of special status species, abundance and distribution of exotic fish species, benthic macroinvertebrate (surveys at 5-10 year intervals), fish habitat (survey at 10-15 year intervals), the effectiveness of fish structures, and annual salmonid population studies.
All	Road closures	Fire	Watershed wide	Utilize gate closures during periods of very high to extreme fire danger.
All	High intensity fire occurrence	Fire, erosion processes, wildlife	Watershed wide	Consideration of fuel modification zones (FMCS) on ridgetops throughout the watershed. A connected system of these zones on ridgetops would create opportunities to compartmentalize wildfires into small drainages and prevent large scale wildfire occurrence. Reduce the risk of a high-intensity fire occurrence and return to a condition that will produce a low-intensity fire regime.
All	Road access	Fire, human uses	Watershed wide	Maintain and enhance strategic road access for wildfire suppression forces. Access will be critical in the short term to prevent large fire occurrence. This is especially important where we have high value forest stands or other high values at risk. Decommissioning of roads should not occur until hazard reduction and maintenance plans are in place. Consideration should be given for erosion and sedimentation. Additionally, human safety during fire suppression needs to be considered. It is especially important to not create dead-end road systems in drainages which currently have road systems that connect out into other drainages. These are important escape routes and may influence the decision to fight fire in a drainage or let it go.
All	Heliports	Fire	Watershed wide	Create heliports and pump chances as opportunities and need is identified, with consideration of water rights and fish passage.

Table VI-1: Management Recommendations (All Land Allocations)

Land Allocation	Issue/ Concern	Related Core Topic	Location	Recommendation
All	Fire hazard	Fire, human uses	Watershed wide	Fuel hazard reduction on BLM lands adjacent to private land with high priority for those lands adjacent to residential areas (RIA). Encourage coordinated approach with private owners/managers.
All	Dispersed recreational use	Human uses	Watershed wide	Conduct Recreation Opportunity Spectrum Inventory on BLM lands within the watershed to determine amount and type of use. Use this information to provide recreation sites where needed, and manage levels of use criteria where it will decrease adverse impacts created by current use (i.e., erosion, sedimentation, denuded vegetation in riparian areas, introduction of exotic species).
All	Road density	Erosion processes, human use, water quality, hydrology	Watershed wide	To better focus on areas of high road density, complete road density determinations at the HUC7 watershed level.
All	Illegal use of watershed	Human uses	Watershed wide	Minimize the amount of illegal activities in the watershed (dumping, firewood cutting, occupancy) by enforcing rules and regulations, increasing visible presence in the area and educating public about protection of resources. Close any dead-end natural surface road and consider gating or blocking other roads susceptible to illegal activities.
All	Public outreach	All	Watershed wide	Provide public outreach to inform residents of the need for and the feasibility of implementing the watershed projects.
All	Soil erosion rates	Erosion processes	Entire watershed	Reduce the soil erosion rates on Siskiyou and other granitic soil series by limiting the ground disturbing activities and testing innovative ways of accomplishing this goal.

Table VI-2: Management Recommendations (Matrix Land Allocations)

Land Allocation	Issue/ Concern	Related Core Topic	Location	Recommendation
Matrix	Land retention	Human uses, wildlife.	Highland Park	Retain the public land at the location of the old Highland Park Recreation and Public Purposes Act lease in public ownership. This parcel is within the City of Grants Pass Urban Growth Boundary with residential growth present on adjacent properties. The retention of this parcel would provide opportunity for existing and future recreational use and wildlife habitat.
Matrix	Matrix	Species and habitat (Wildlife)	Mapped locations	When planning projects, conduct forest management activities in a manner that mimics natural disturbance and maintains species and structural diversity. Focus timber harvest on large pole stands. Maintain and increase connectivity of older stands consistent with NFP S&GS.
Matrix	Old-growth habitat	Species and habitat (Wildlife, Botany)	Mapped locations (McKelvey 1)	Where possible and consistent with NFP S&GS, maintain mature and old-growth habitat, promote stand size (acres) and connectivity by manipulating adjacent stands to achieve old-growth conditions.
Matrix	Hazard reduction	Fire, vegetation, human uses	Watershed wide	Accomplish hazard reduction treatments (thinning, brushing and burning) along BLM property lines at low elevations where high risk exists. First priority is in the rural interface areas. This will create defensible zones where wildfire spread would be slow and allow fire suppression forces time to respond and contain fires at small sizes.

Table VI-2: Management Recommendations (Matrix Land Allocations)

Land Allocation	Issue/ Concern	Related Core Topic	Location	Recommendation
Matrix	Hazard reduction	Fire	Watershed wide	Accomplish hazard reduction treatments along midslope and Ridgetops road systems on BLM lands. This would create defensible zones and opportunities for suppression forces to contain fires and potentially prevent Ridgetops to valley floor fire occurrence.

Table VI-3: Management Recommendations (Special Areas)

Land Allocation	Issue/Concern	Related Core Topic	Location	Recommendation
Special areas	Spotted owl cores	Species and habitat (Wildlife)	Provincial home range of known sites	Employ silvicultural treatments where possible to increase amount of McKelvy 1 & 2 quality spotted owl habitat within provincial home range of spotted owls (1,388 acres within 1.3 miles of spotted owl cores).
Special areas	High value stands	Fire	Watershed wide	Identify stands and other features of high resource value that are at risk (owl cores, old growth, special areas) and treat hazard within or adjacent to these stands. Objective would be to preserve these in the short term from loss to wildfire.

Table VI-4: Management Recommendations (Riparian Reserves)

Land Allocation	Issue/Concern	Related Core Topic	Location	Recommendation
Riparian Reserves	Culverts	Species and habitat (Aquatic), hydrology, human uses	Watershed wide	Upon completion of TMOs process, prioritize the replacement of culverts obstructing fish passage in the following order: coho streams, steelhead streams, non-anadromous streams. Culverts on fish-bearing streams with gradients greater than 3% should have natural streambed with no pool below culvert.
Riparian Reserves	Stream flow	Species and habitat (Aquatic), Hydrology	Watershed wide	Support and encourage efforts within the watershed that will increase instream flows from April through October. (This would pertain to water withdrawals on private land.)

Table VI-4: Management Recommendations (Riparian Reserves)

Land Allocation	Issue/Concern	Related Core Topic	Location	Recommendation
Riparian Reserves	Roads	Species and habitat (Aquatic), Erosion Processes, Hydrology, Human Uses	Watershed wide	Based on TMOs, decommission/relocate roads within riparian reserves which are major sedimentation sources to fish-bearing streams. Surface roads used during the wet season and close (decommission, gate, berricade) or improve roads not surfaced.
Riparian Reserves	Canopy closure	Hydrology	Watershed wide	Manage the transient snow zone along the ridgelines above Savage Creek system in a manner that minimizes the creation of large openings (>1 acre) and retains total (all vegetation levels shrubs and higher) canopy closure greater than 70%. This does not apply to precommercial thinning.
Riparian Reserves	LWD	Aquatic systems, Fisheries	Savage, Greens, Jones, Gilbert, Fruitdale Creeks	Actively work towards meeting ODFW's LWD benchmark (based on optimum level /old-growth forest conditions): 20 pieces/100 m of stream of material 30feet x 15-inch diameter LWD or greater.
Riparian Reserves	Fish passage	Fisheries	Greens, Jones, Gilbert, Fruitdale Creeks	In these streams, which have adequate spawning gravels and capability to sustain salmonid populations, redesign irrigation ditches to allow up and downstream fish passage.
Riparian Reserves	Low stream flows	Hydrology	Watershed wide	Discourage spring development or surface/groundwater diversions on BLM-administered lands.

Table VI-5: Data Gaps (August 1998)

Core Topic	Data Gap
Botany	Watershed has only been partially surveyed: Nonvascular plants: No surveys have been conducted, need to survey for at least Survey & Manage species. Vascular plants: Only approximately 27% of the watershed has been surveyed to date (8/98), need to survey the remainder. Noxious weeds: No surveys have been conducted. Wetlands/seeps: Little known about location and extent; very few special status plant surveys done in this habitat.
Wildlife	Presence/absence information for most of the special status species is unknown. Little information on special status species habitats and condition of these habitats. Location of unique habitats such as wallows, mineral licks, migration corridor for the most part unknown.
Fisheries	ODFW Habitat Inventory: Only one stream was inventoried (Bloody Run Creek) within the watershed. Macroinvertebrate inventories: No BLM inventories have been conducted within the watershed. Spawning Surveys: No spawning surveys have been conducted within the watershed. Information regarding non-salmonid fish distribution is lacking. Abundance of salmonids. Intra-specific and inter-specific competition of fish species. Identification of culverts that are obstructing fish passage (part of the TMOS process). Stream shading: Identification of areas where stream canopy closure is less than 75%.
Human use	Transportation Management Objectives (TMOs): TMOs have not been completed for this watershed. BLM Capitalized Roads: Road drainage, road grade, surface depth, road condition and barricade information exists in various formats. Some of this information has not been updated as changes occur. Therefore, existing information may not be accurate. BLM Non-capitalized Roads and Skid Trails: These types of roads and skid trails have not been inventoried. Non-BLM Roads and Skid Trails: These types of roads and skid trails have not been inventoried. Quarries: Quarry data gaps exist where the required information is missing on the Rock Resource Inventory data sheet. Recreation: Data regarding levels of recreation use (amount and type) is very sketchy. A Recreation Opportunity Spectrum inventory of the existing opportunities that are available in the watershed has not been completed. Sociological: Compilation of existing sociological information on the watershed regarding trends and community issues would be useful in working with the community on projects.
Hydrologic Riparian	Stream condition on BLM and non-federal lands unknown. Functioning condition of riparian areas on all land unknown. Surveys/inventory of plant and animal species that inhabit the riparian buffers.
Soils	Soil erosion rates unknown. Soil dependant plant, animal and microbial species are unknown. More information regarding road densities in subwatersheds within Grants Pass Watershed. More information about compaction and disturbance levels within subwatersheds.
Vegetation	Stand examination inventory data, including snag and down wood data, for the federal lands in the watershed is inaccurate and does not accurately represent stand conditions. Previous harvest data on BLM and non-federal lands is not available.
Fire	Identification of individuals who have special concerns with prescribed burning emissions, smoke dispersion modeling and amounts of smoke produced from understory burning largely unknown. Baseline emission data for various plant association and theoretical emission information for various plant association is absent. Historic fire and current fire information is not mapped. Fuel models: Locations are not known or mapped for private lands, nor are the fuel models, profile, duff levels, and amounts of large woody debris amounts and locations known for private lands.

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Appendix A: Maps

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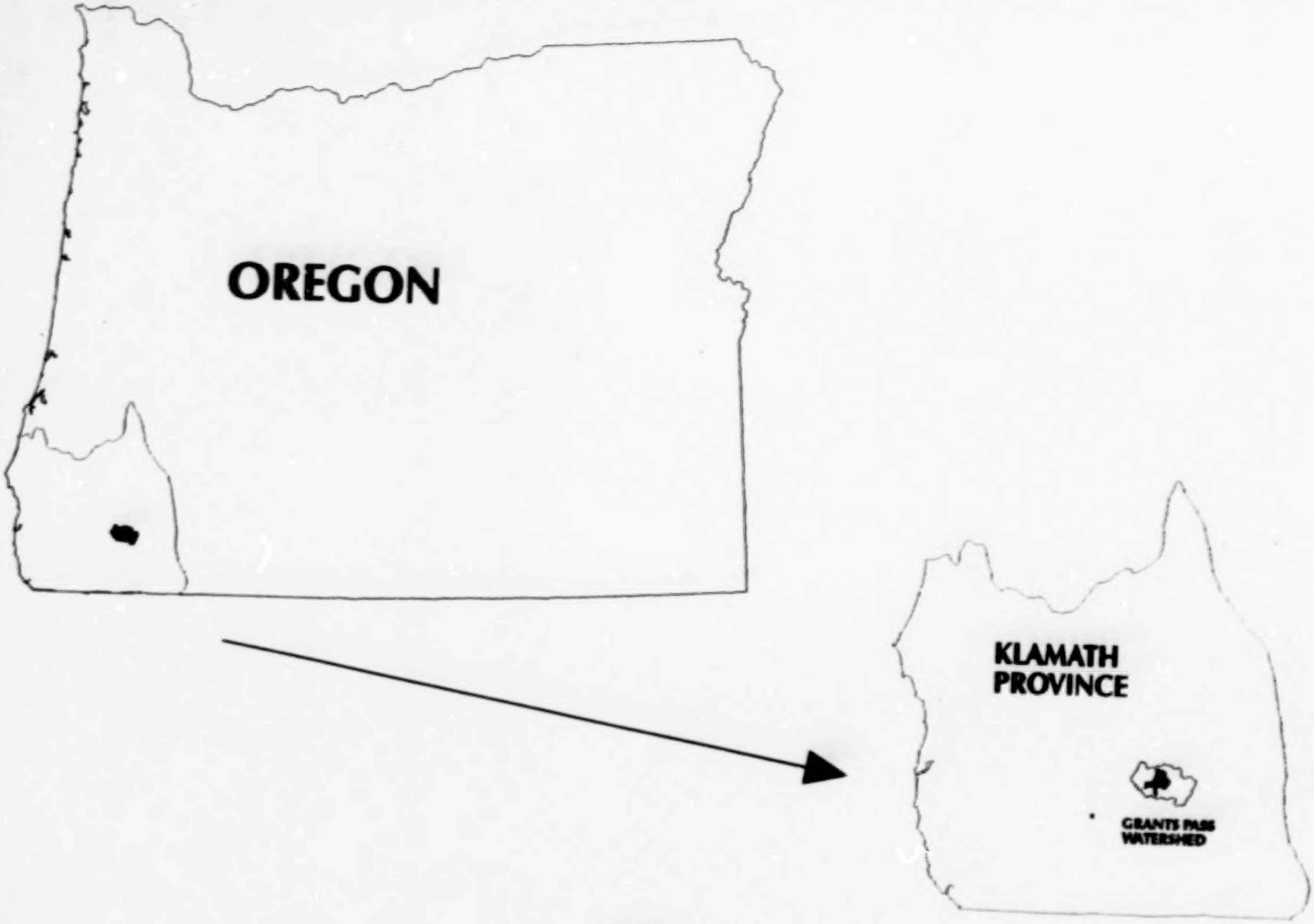
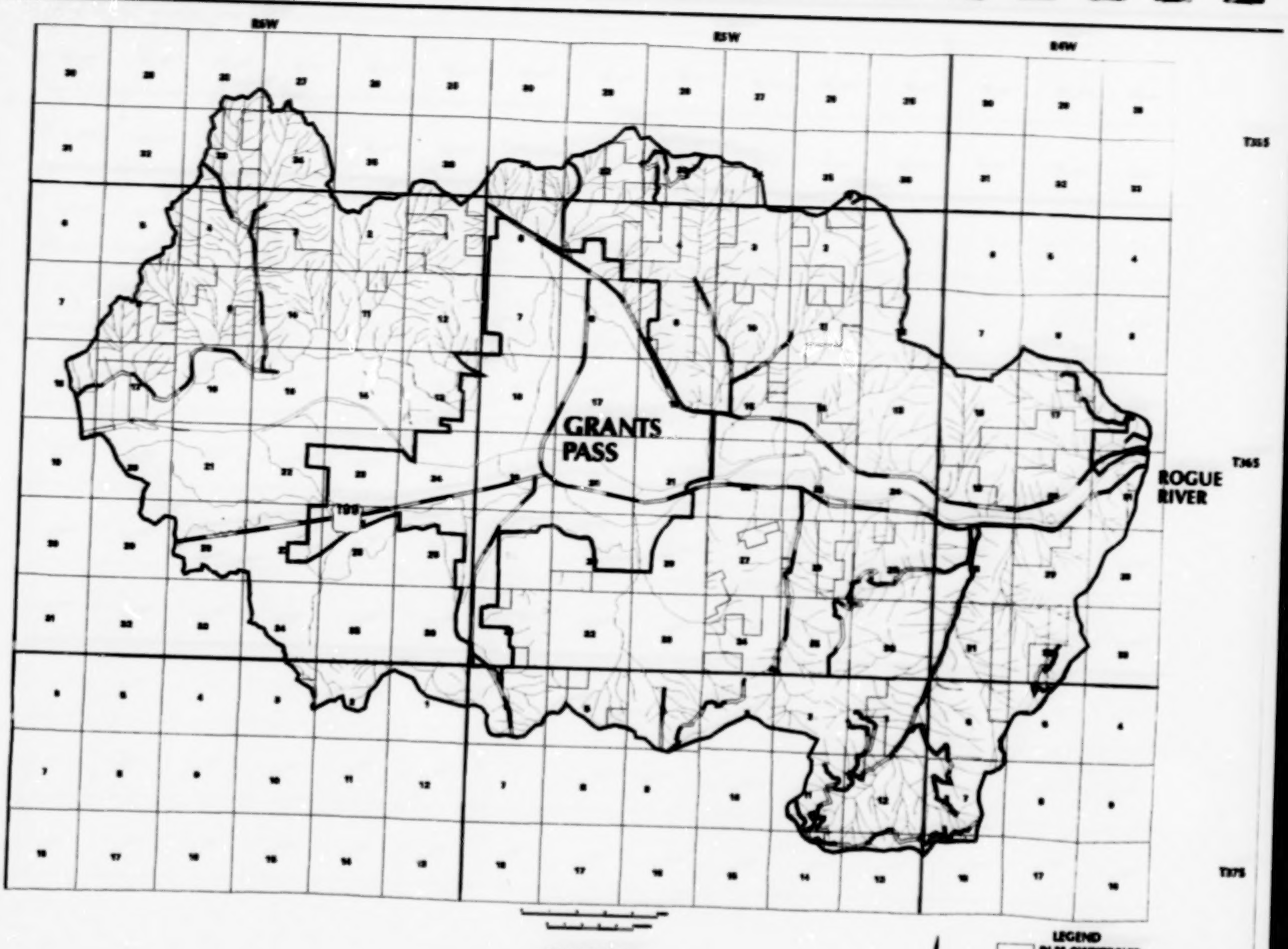


MAP 1:

GENERAL LOCATION of the GRANTS PASS WATERSHED

July 8, 1996
Dennis Glover

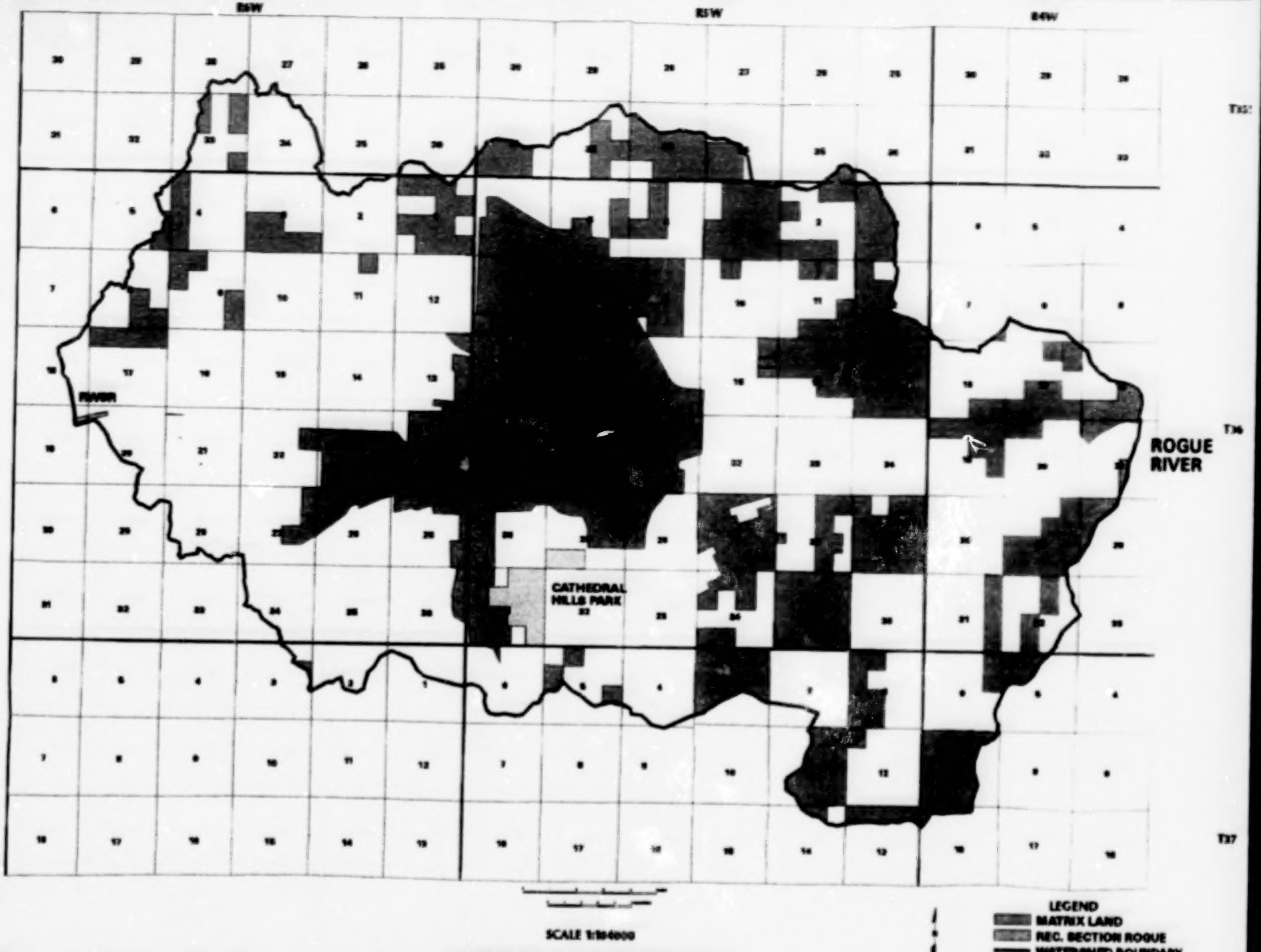
Note: No warra[illegible] is made by the Bureau of Land Manage[illegible] as to the accuracy, reliability, or comple[illegible] of these data for individual use or aggre[illegible] with other data.



March 9, 1998
Dennis Glover

Note: No warranty is made by the Bureau of Land Management as to the accuracy, reliability, or completeness of these data for individual use or aggregate use with other data

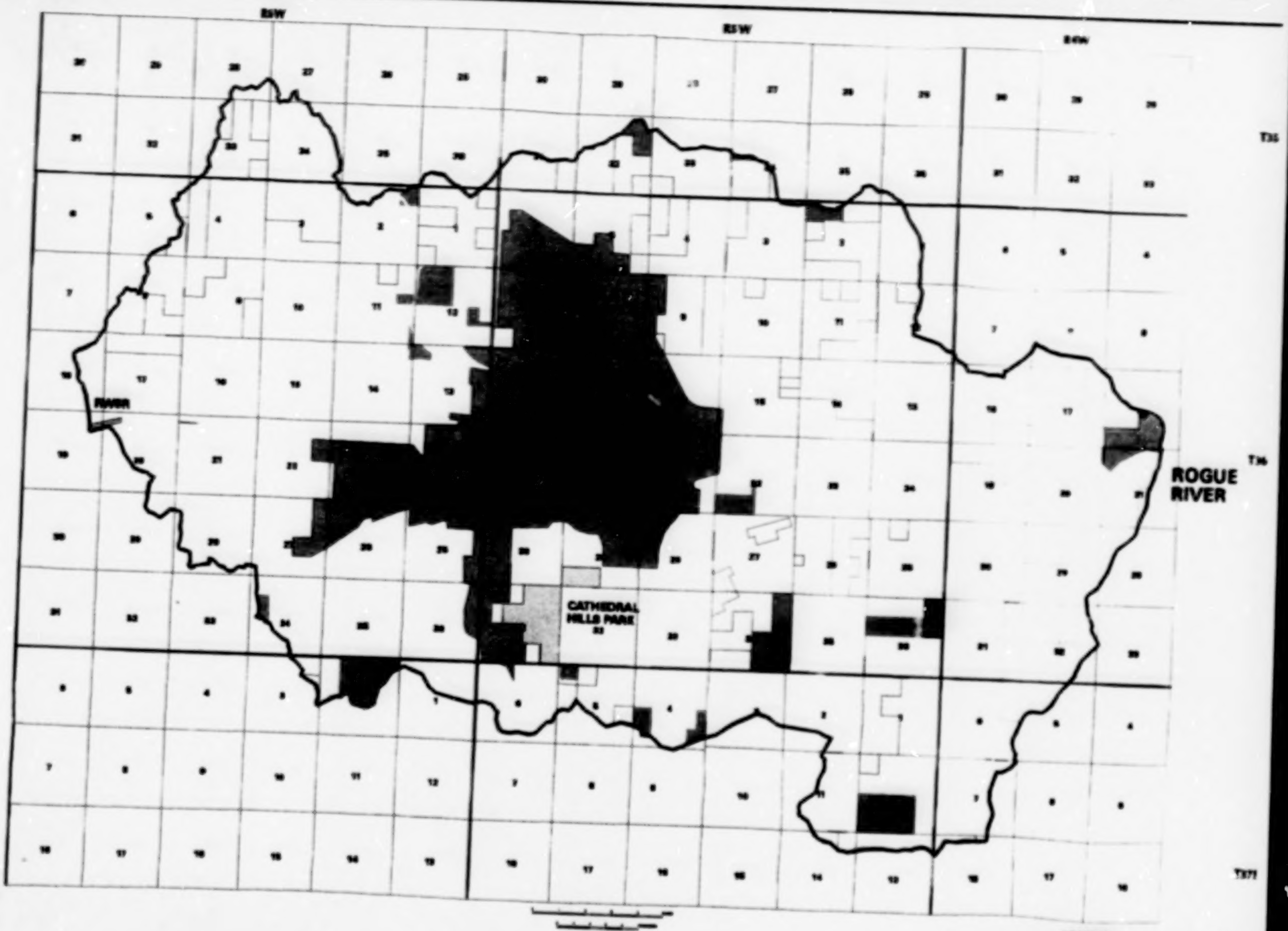
MAP 2: BLM OWNERSHIP IN THE GRANTS PASS WATERSHED



March 9, 1998
Dennis Glover

Note: No warranty is made by the Bureau of Land Management as to the accuracy, reliability, or completeness of these data for individual use or aggregate use with other data

MAP 3: LAND USE ALLOCATIONS IN THE GRANTS PASS WATERSHED



May 19, 1998

Dennis Glover

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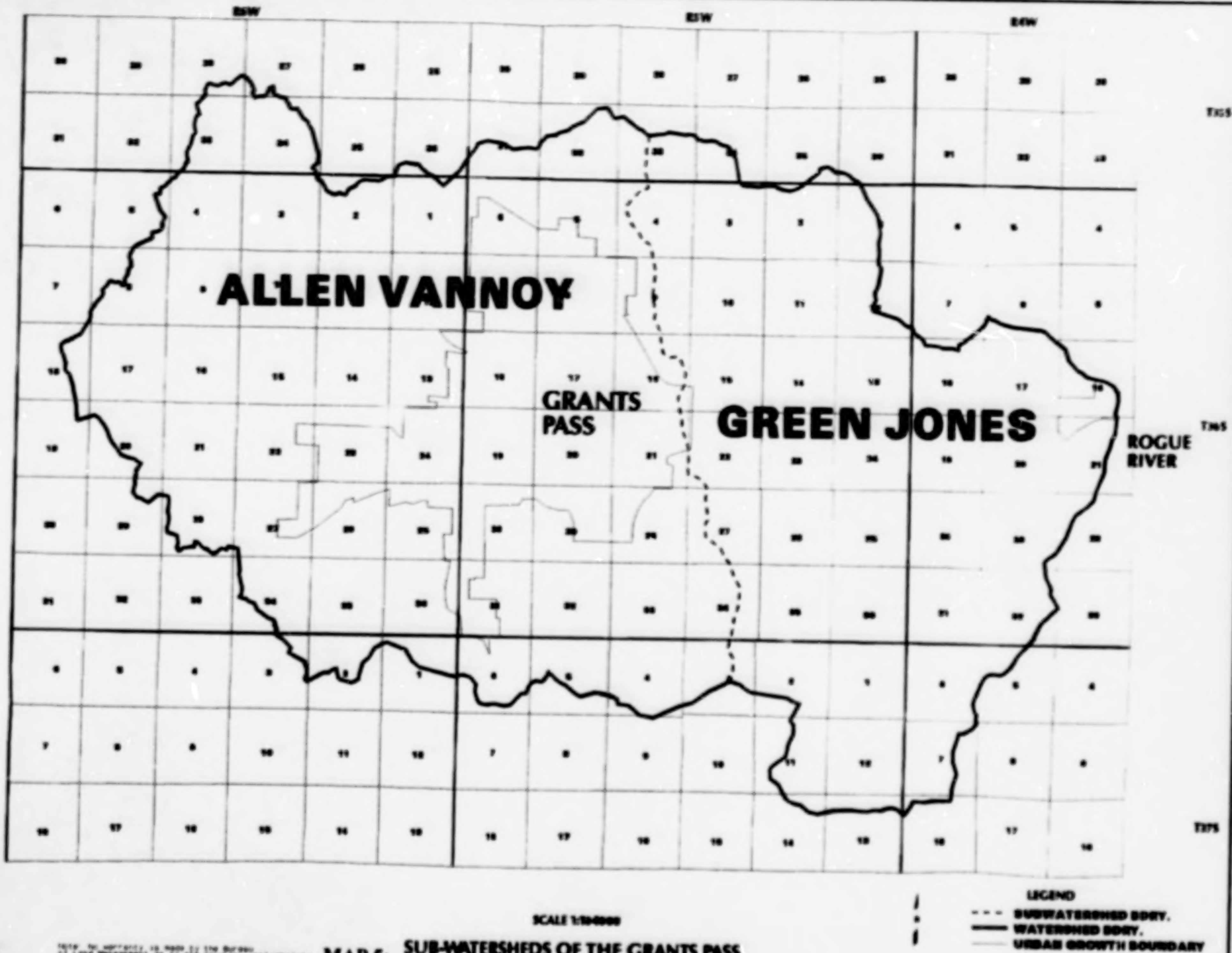
MAP 4: STATE & COUNTY LAND IN THE GRANTS PASS WATERSHED



June 25, 1996
Dennis Glover

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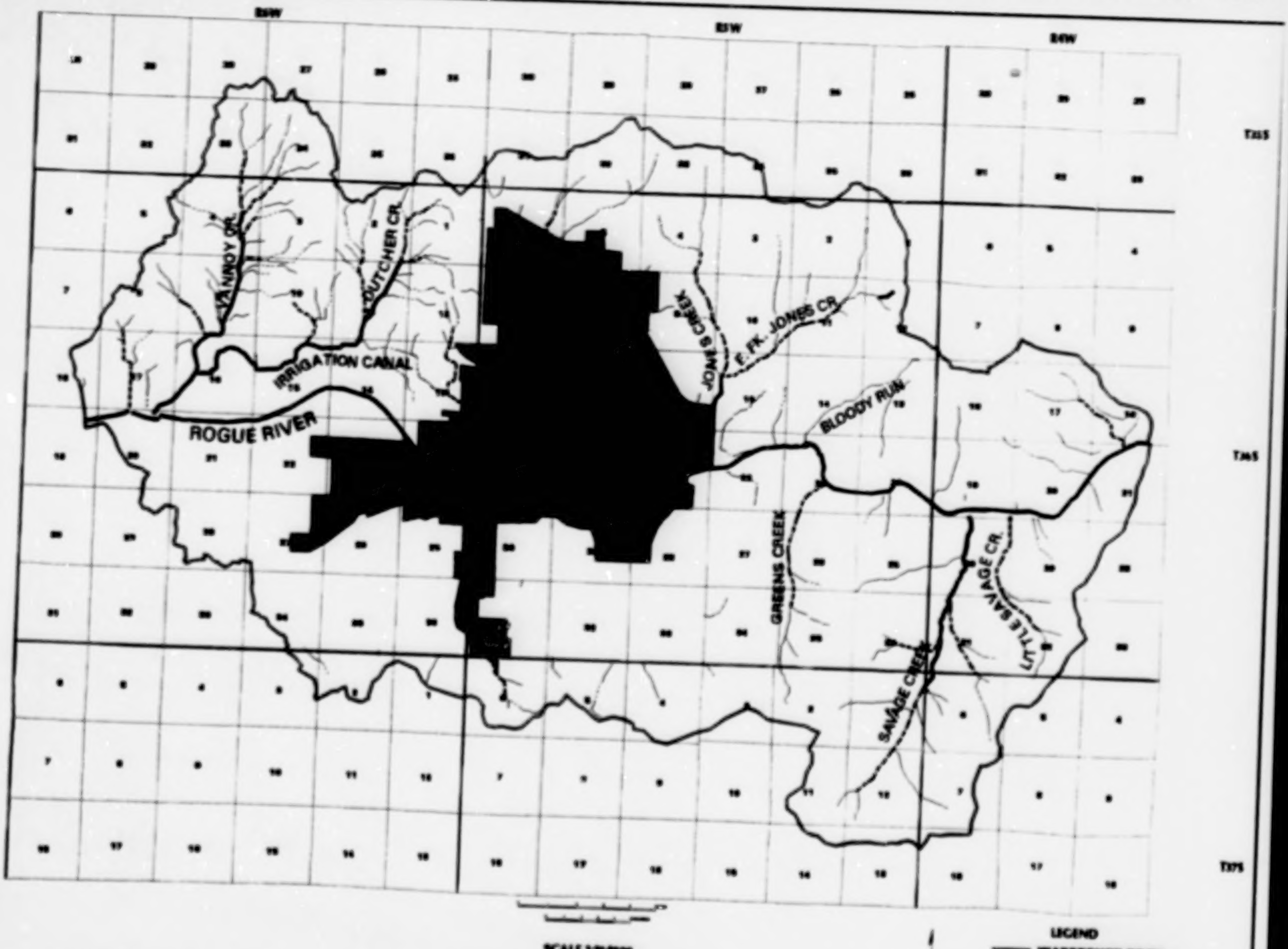
MAP 5: SUB-WATERSHEDS OF THE GRANTS PASS WATERSHED (BASED ON HUC6)

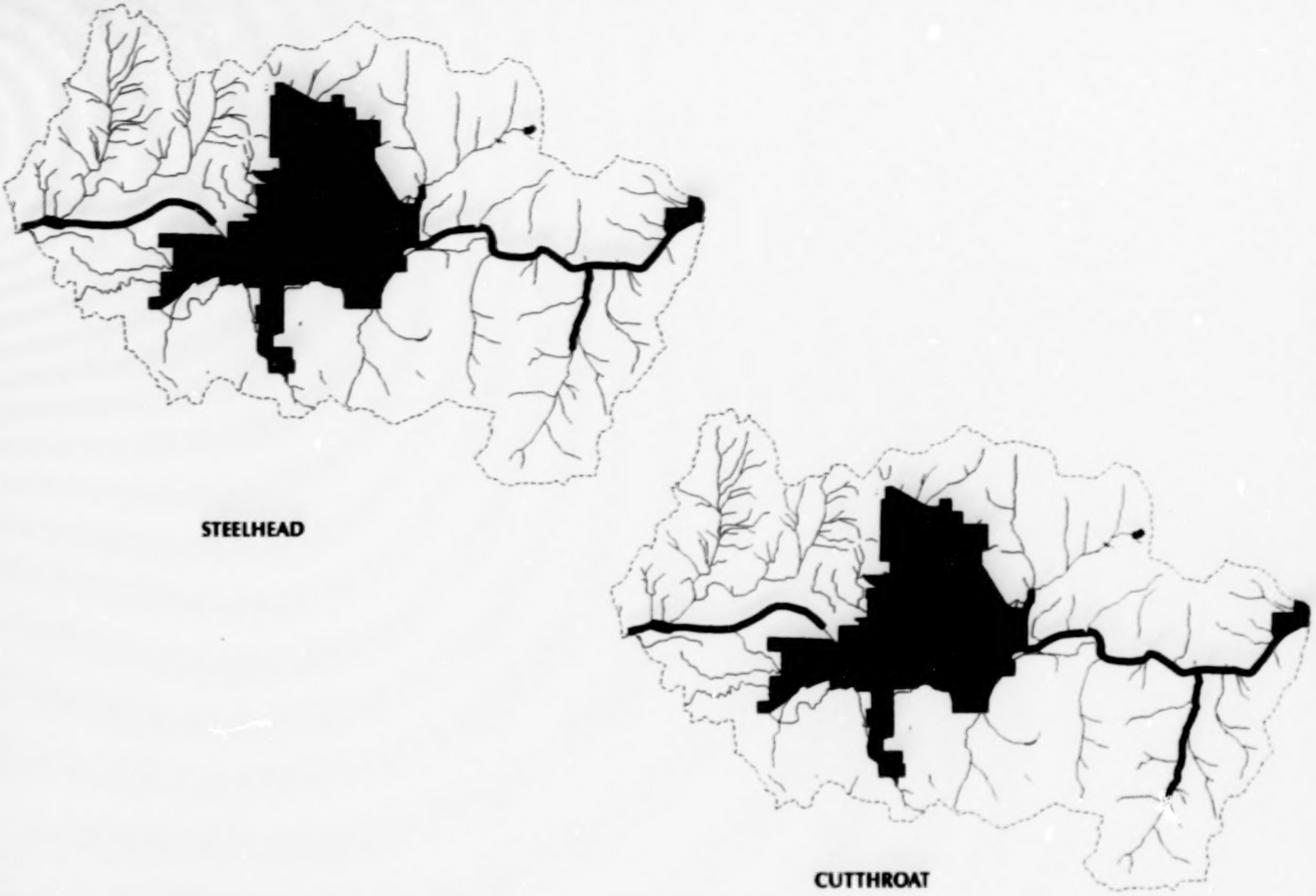


July 30, 1996

Dennis Glover

No warranty is made by the Bureau
of Land Management as to the accuracy, reliability,
or completeness of these data for individual use
or aggregate use with other data

MAP 6: STREAM ORDERS (> 2) IN THE GRANTS PASS WATERSHED



STEELHEAD

CUTTHROAT

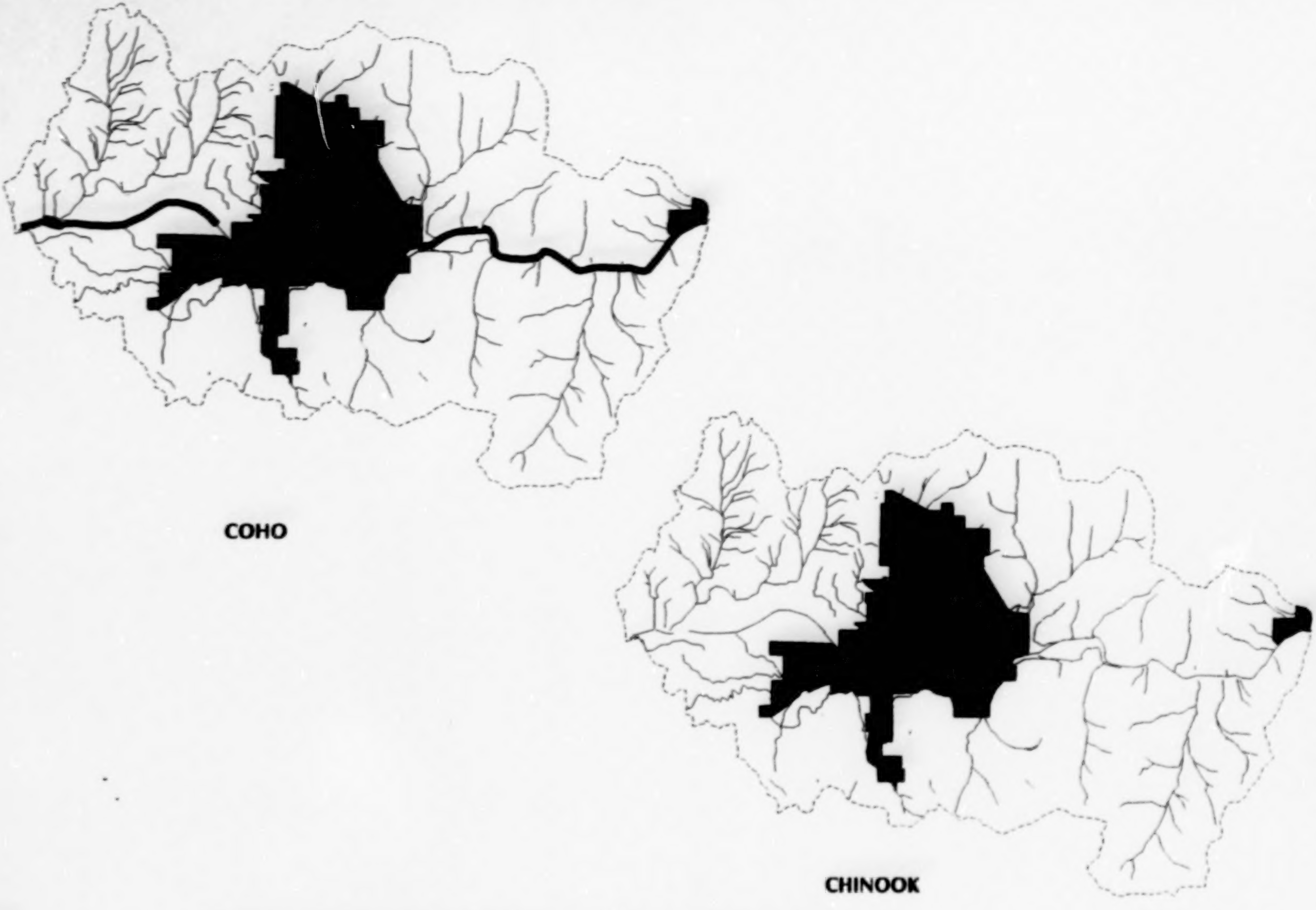
MAP 7: APPROXIMATE DISTRIBUTION OF CUTTHROAT & STEELHEAD SALMONIDS IN THE GRANTS PASS WATERSHED

LEGEND

- - - - WATERSHED BDRY.
▬ DISTRIBUTION OF FISH
■ URBAN GROWTH BOUNDARY

June 26, 1996
Dennis Glover

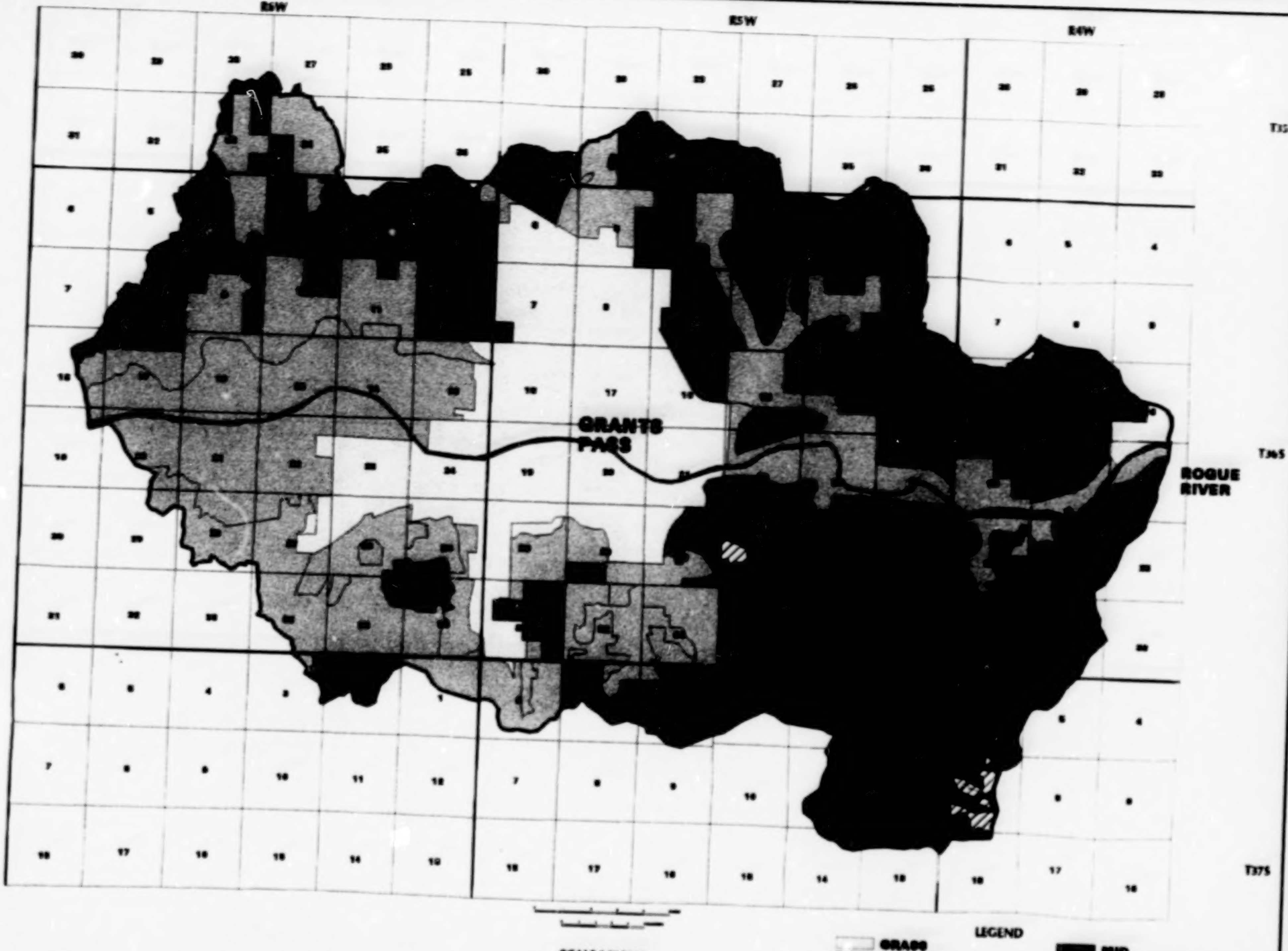
Note: No warranty is made by the Bureau of Land Management as to the accuracy, reliability, or completeness of these data for individual use or aggregate use with other data



MAP 8: APPROXIMATE DISTRIBUTION OF COHO & CHINOOK SALMONIDS IN THE GRANTS PASS WATERSHED

July 8, 1996
Dennis Glover

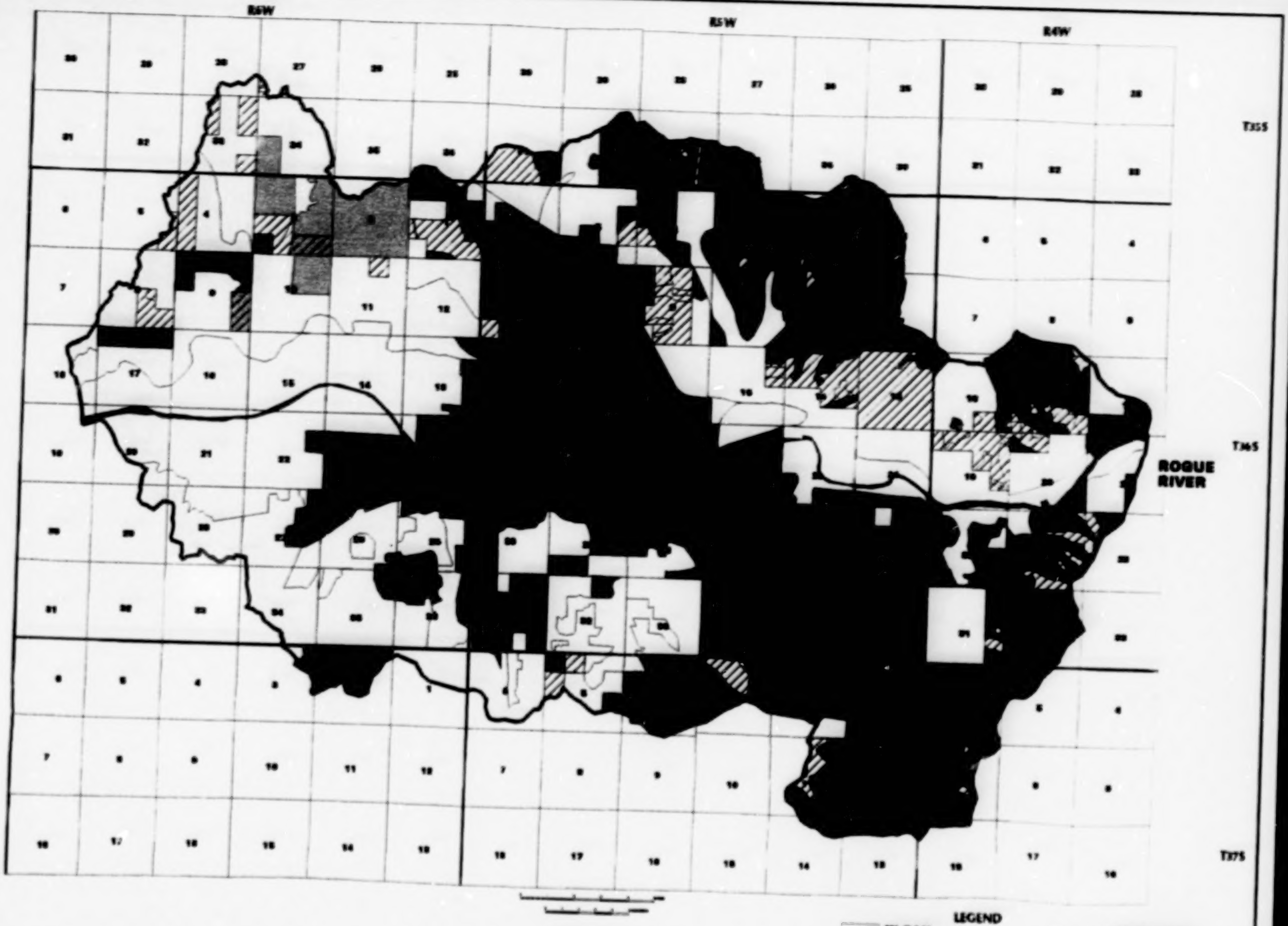
Note: No warranty is made by the Bureau of Land Management as to the accuracy, reliability, or completeness of these data for individual use or aggregate use with other data



Sept. 18, 1996
Dennis Glover

Note: No warranty is made by the Bureau of Land Management as to the accuracy, reliability, or completeness of these data for individual use or aggregate use with other data

MAP 9: VEG CONDITION CLASS in the GRANTS PASS WATERSHED



SCALE 1:100000

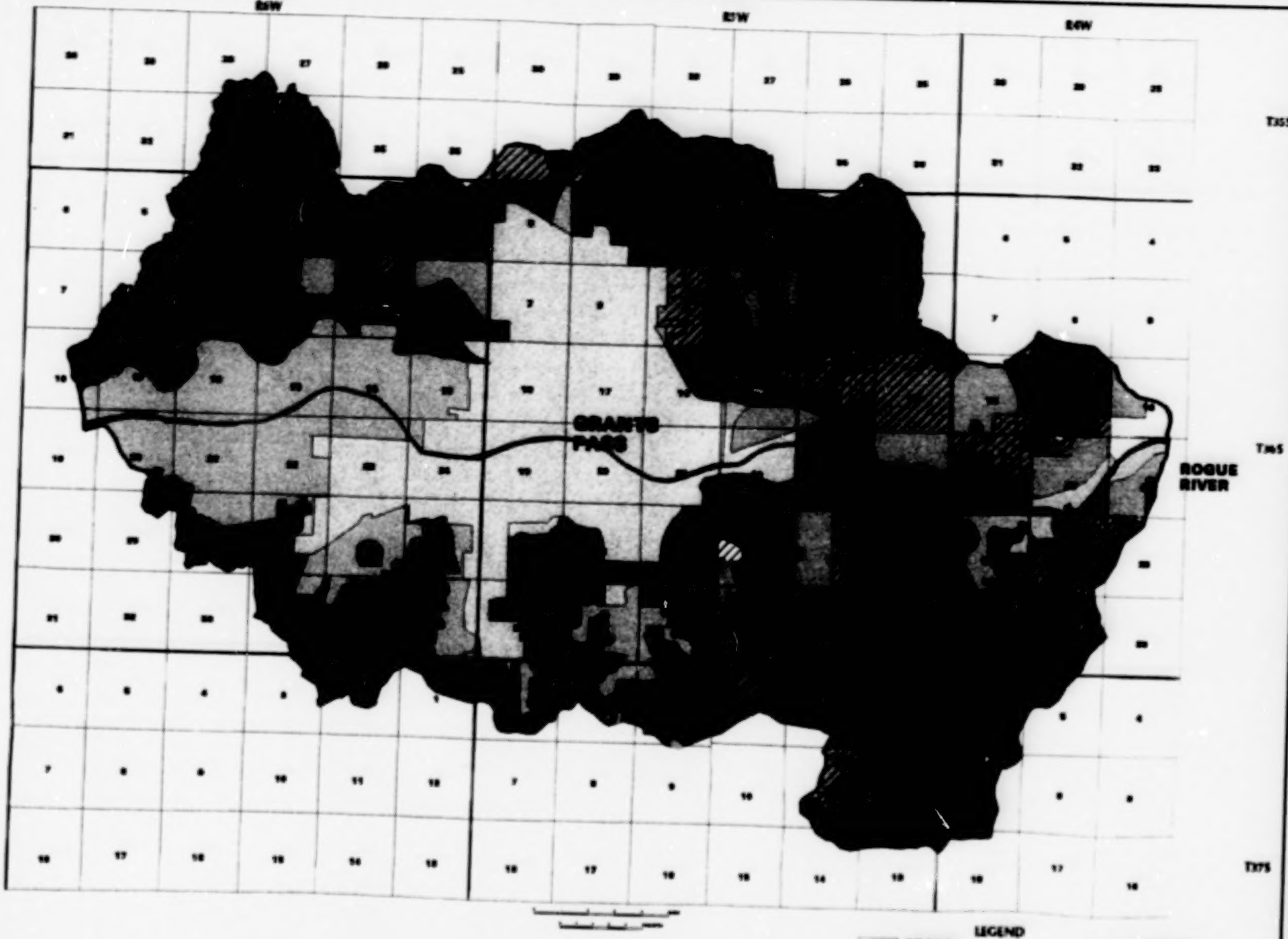
LEGEND

☐ W.OAK	☐ NON FOREST
▨ P.PINE/HARDWOOD	■ NON-VEGETATED
■ J.PINE	☐ BLM OWNERSHIP
■ D.FIR/P.PINE	— WATERSHED BDRY.
■ PINE	
■ D.FIR	

Sept. 10, 1996
Dennis Glover

Note: No warranty is made by the Bureau of Land Management as to the accuracy, reliability, or completeness of these data for individual use or aggregate use with other data.

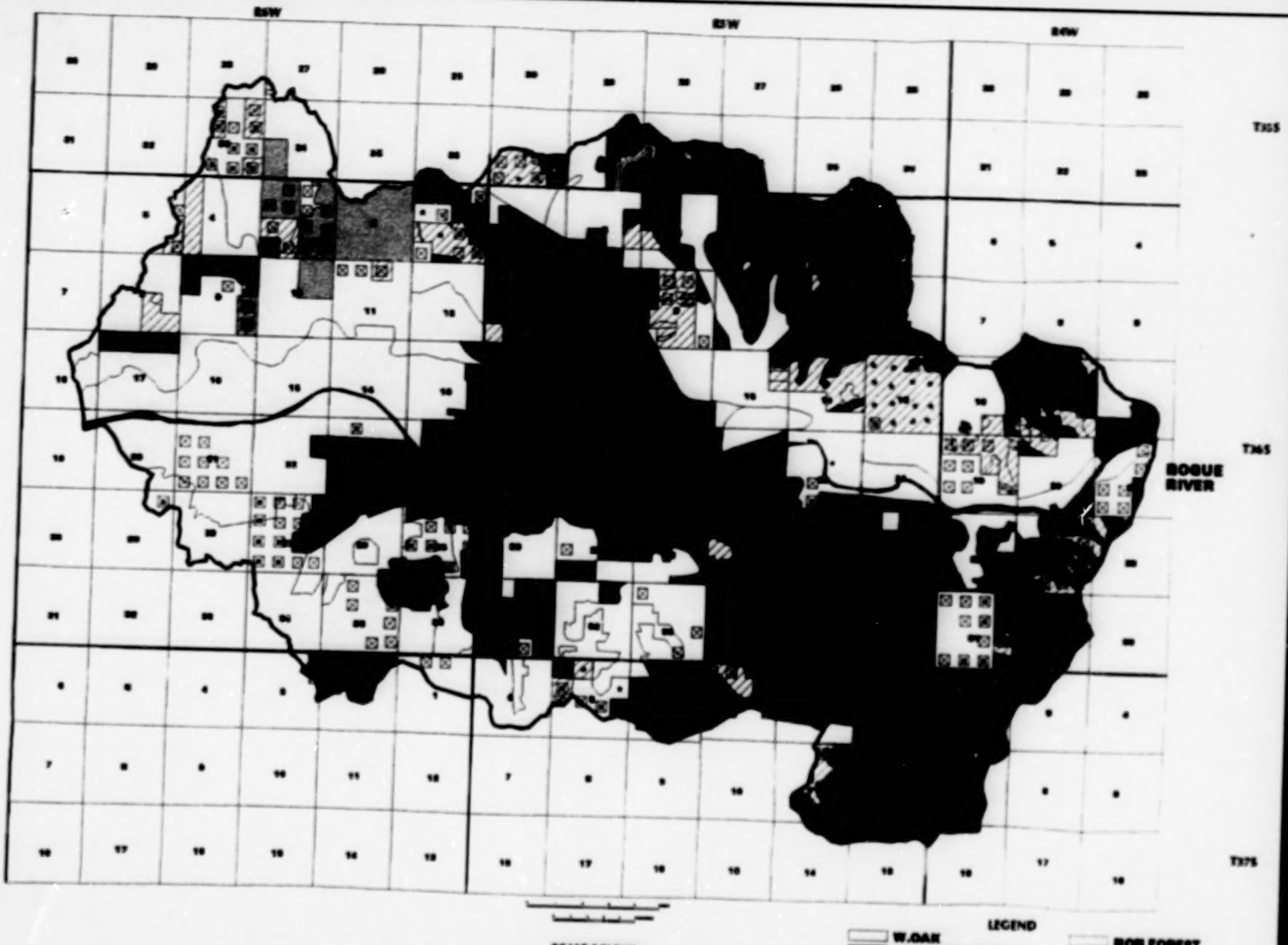
MAP 10: PLANT SERIES in the GRANTS PASS WATERSHED



Sept. 10, 1996
Dennis Glover

Note: No warranty is made by the Bureau of Land Management as to the accuracy, reliability, or completeness of these data for individual use or aggregate use with other data

MAP 11: DOMINANT VEGETATION in the GRANTS PASS WATERSHED



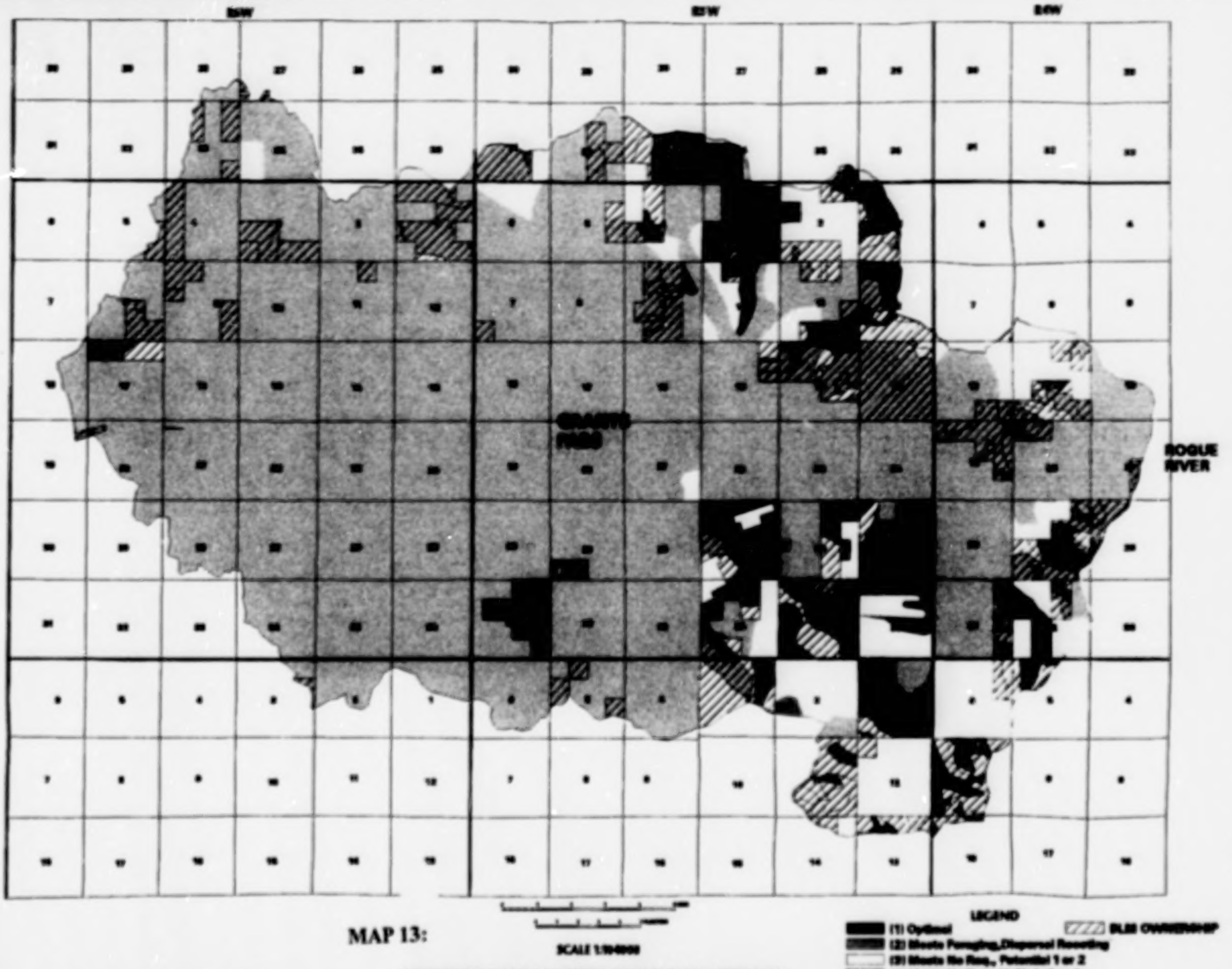
LEGEND

☐	W.OAK	☐	NON FOREST
▨	P.PINE/HARDWOOD	■	NON-VEGETATED
■	J.PINE	⊡	P.PINE(1920)
■	D.FIR/P.PINE	⊠	D.FIR(1920)
■	PINE	⊡	D.FIR/P.PINE(1920)
■	D.FIR	•	W.OAK(1920)

MAP 12: PLANT SERIES & 1920 PLANT SURVEY in the GRANTS PASS WATERSHED

07/14/96
Dennis Glover

NOTE: No warranty is made by the Bureau of Land Management as to the accuracy, reliability, or completeness of these data for individual use or aggregate use with other data

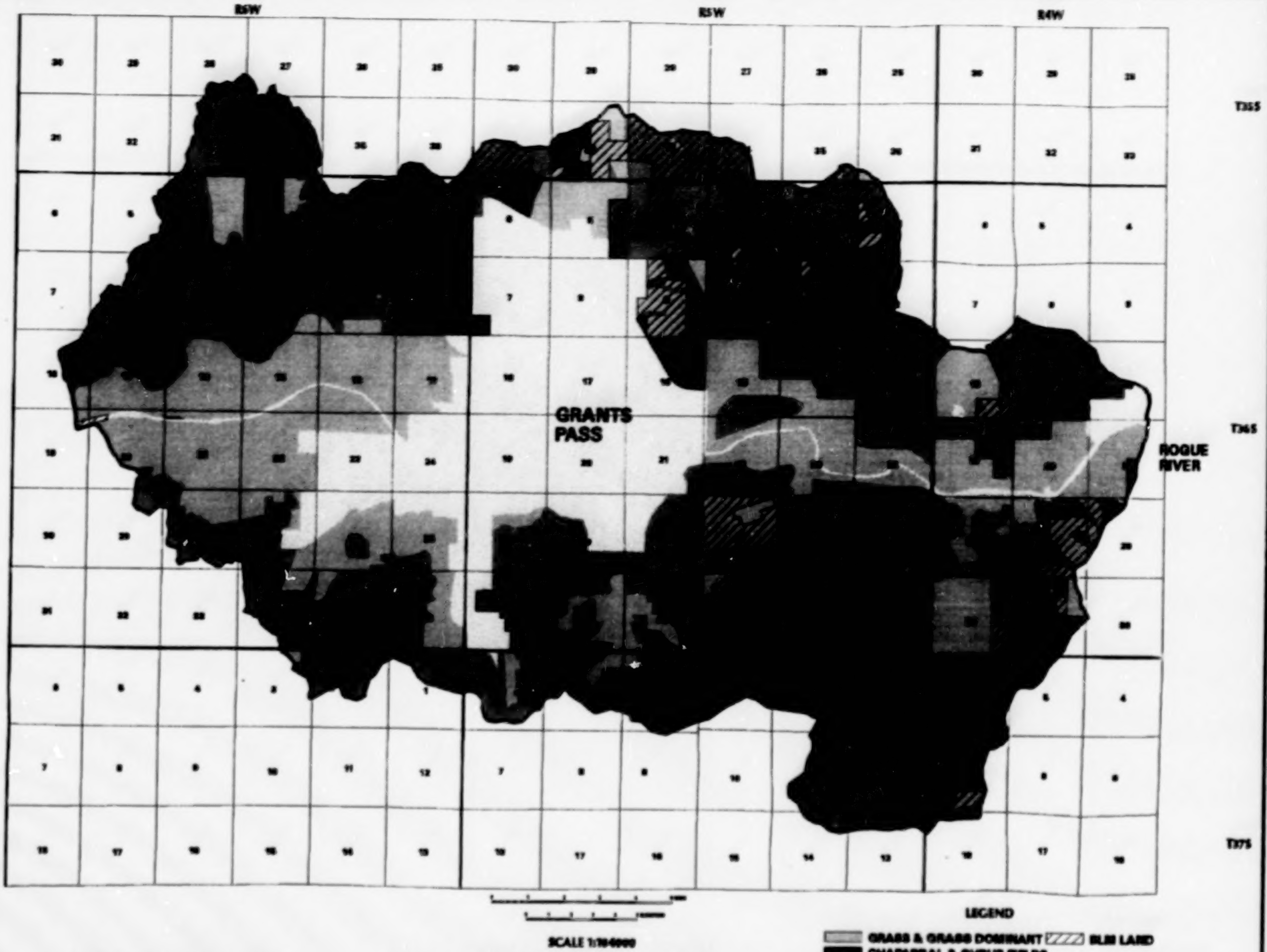

GRANTS PASS
ROGUE RIVER
T36S
T37S
SCALE 1:104000
LEGEND
(1) Optimal
(2) Meets Foraging,Dispersal Roosting
(3) Meets No Req., Potential 1 or 2
(4) Meets No Req., Unlikely 1 or 2
(5) Dispersal Only, Potential 1 or 2
(6) Dispersal Only, Unlikely 1 or 2
BLM OWNERSHIP

MAP 13:

SPOTTED OWL HABITAT RATING (McKELVEY) in the GRANTS PASS WATERSHED

Oct 25, 1996
Dennis Glover

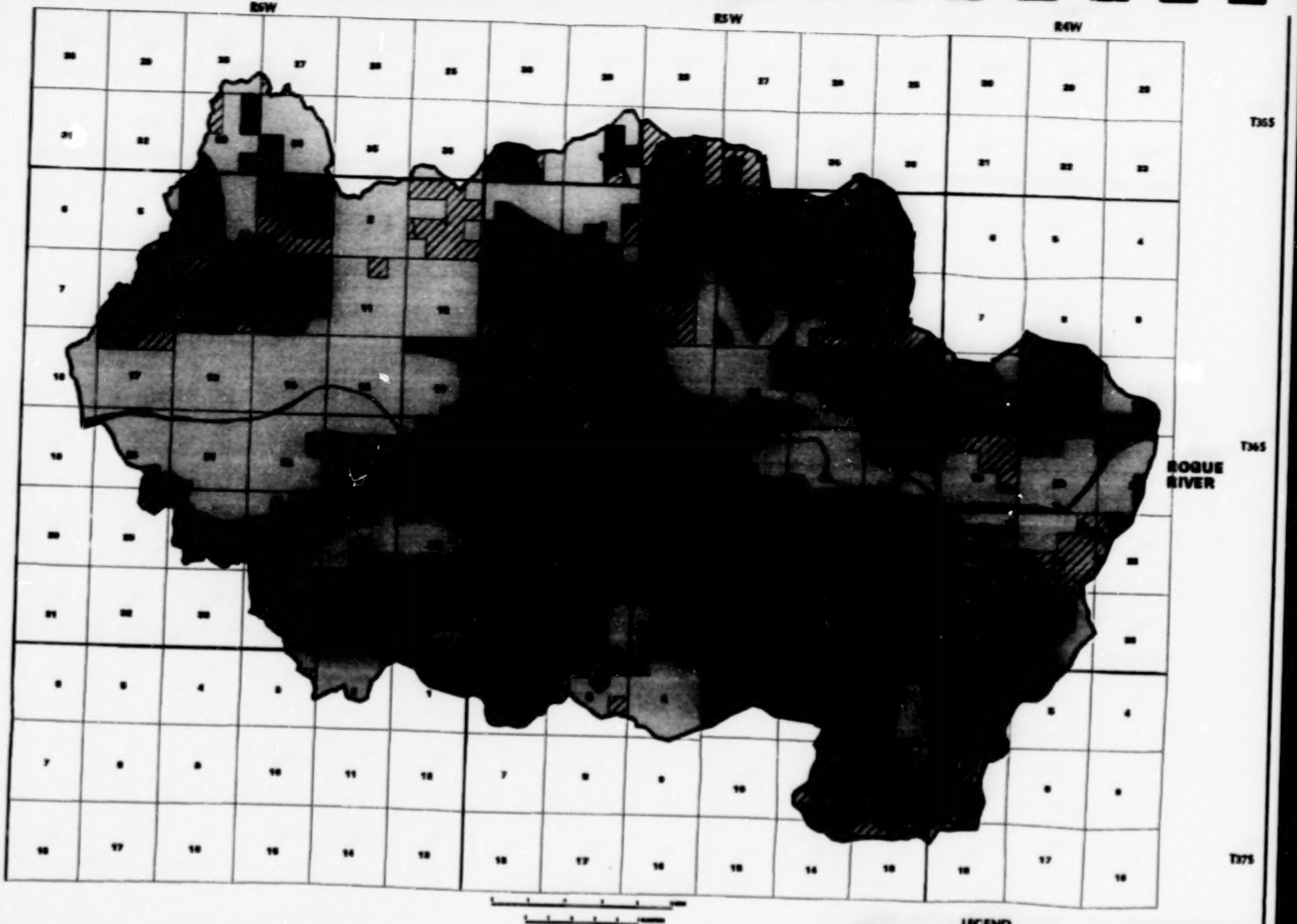
Note: No warranty is made by the Bureau of Land Management as to the accuracy, reliability, or completeness of these data for individual use or aggregate use with other data



MAP 14: FIRE FUEL MODELS IN THE GRANTS PASS WATERSHED

Sept 30, 1996
Dennis Glover

Note: No warranty is made by the Bureau of Land Management as to the accuracy, reliability, or completeness of these data for individual use or aggregate use with other data.



LEGEND

▇ HIGH HAZARD RATING 0 - 24

▒ MODERATE HAZARD RATING 25 - 50

▇ LOW RISK RATING 51 or greater

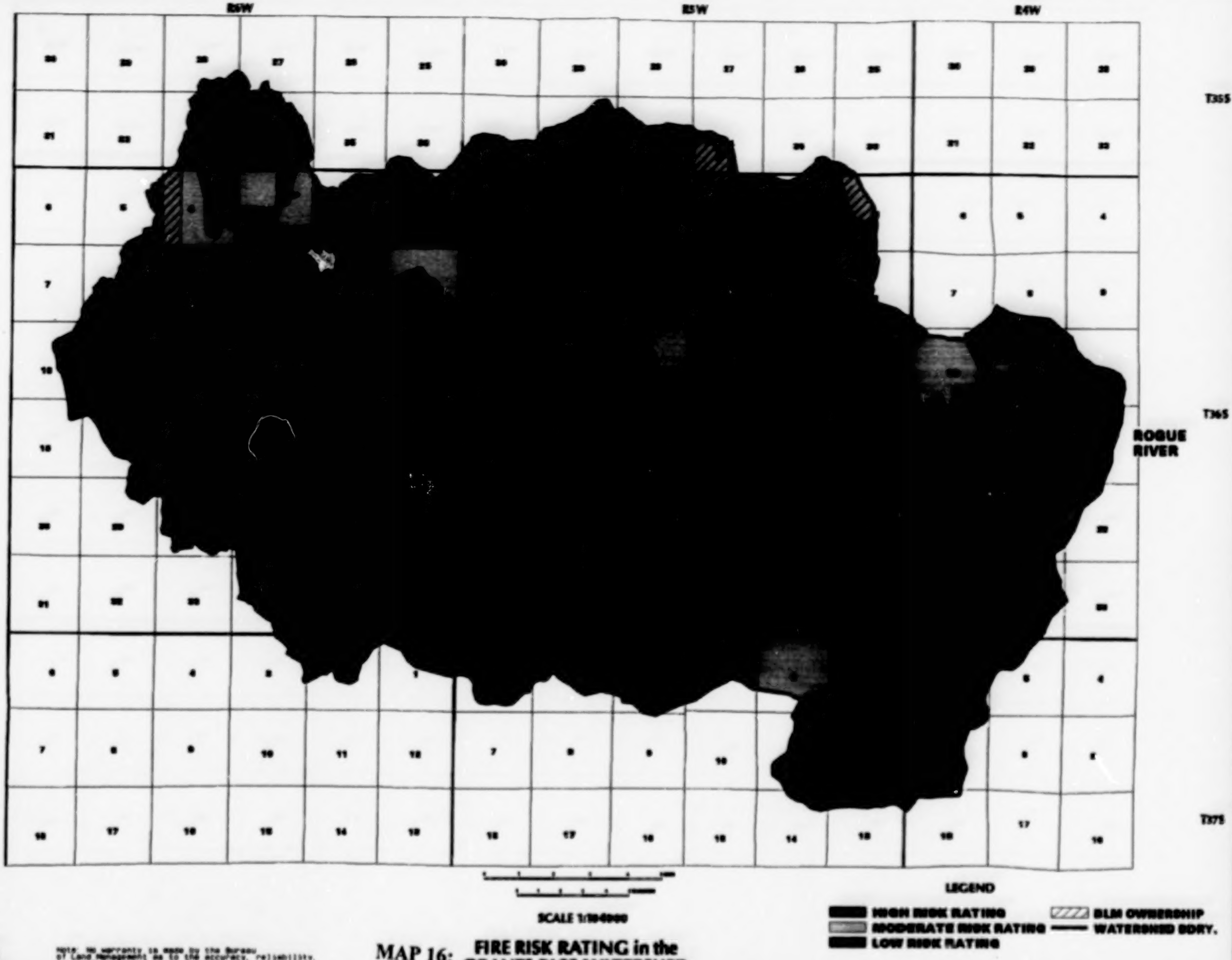
▨ BLM OWNERSHIP

— WATERSHED BDRY.

Sept. 18, 1996
Dennis Glover

Note: No warranty is made by the Bureau of Land Management as to the accuracy, reliability, or completeness of these data for individual use or aggregate use with other data.

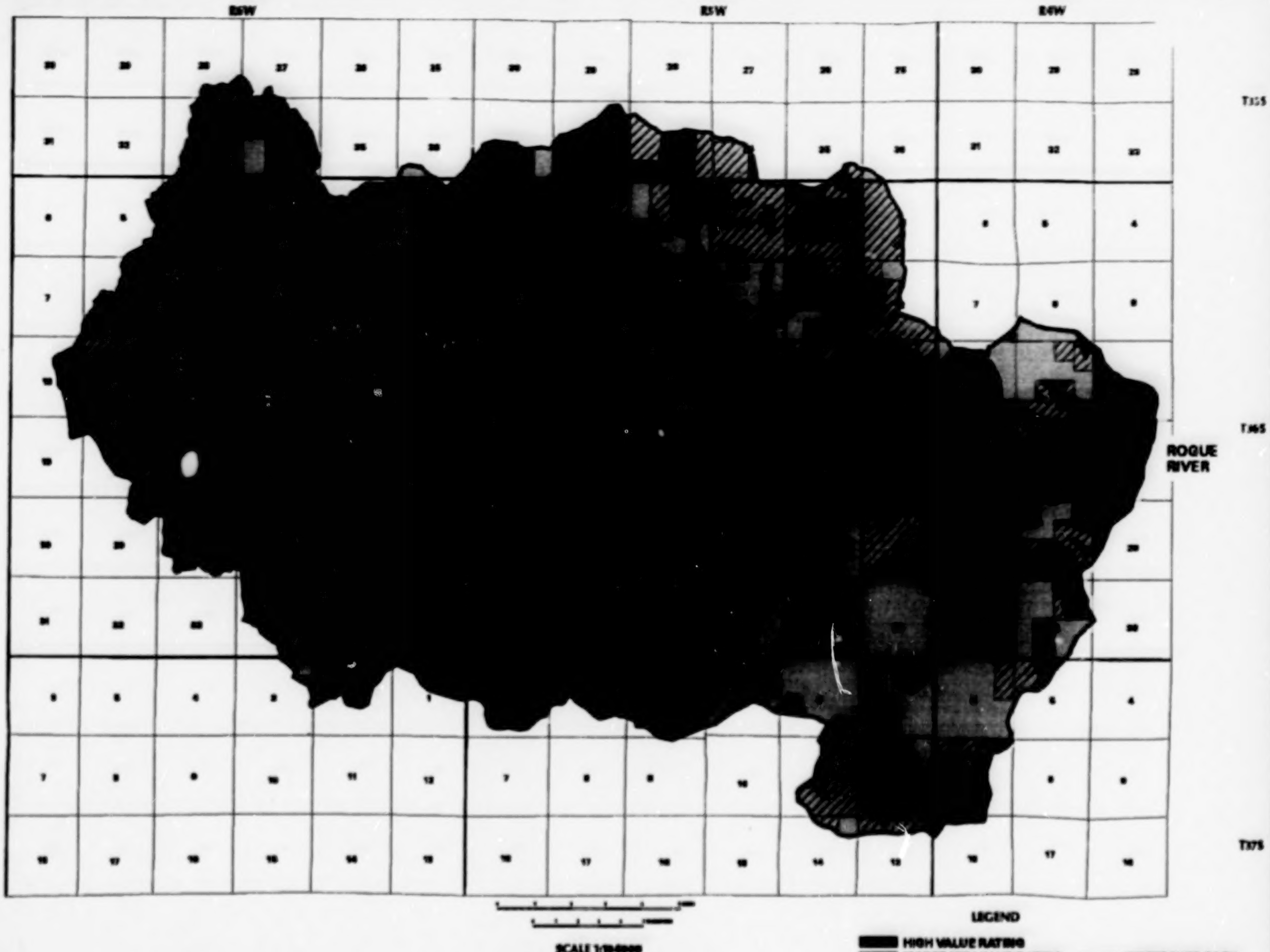
MAP 15: FIRE HAZARD RATING in the GRANTS PASS WATERSHED



Sept. 10, 1996
Dennis Glover

Note: No warranty is made by the Bureau of Land Management as to the accuracy, reliability, or completeness of these data for individual use or aggregate use with other data.

MAP 16: FIRE RISK RATING in the GRANTS PASS WATERSHED



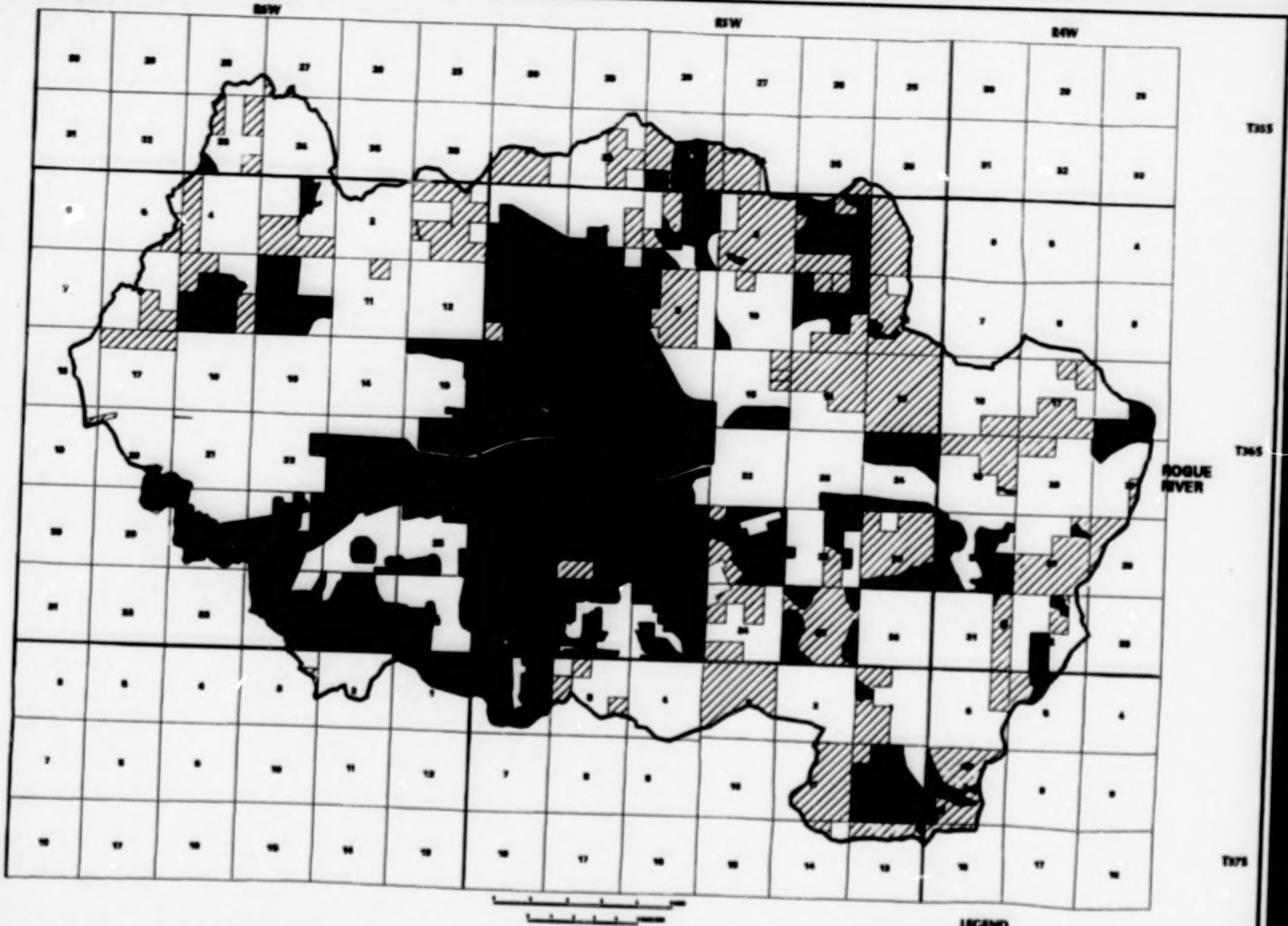
LEGEND

- ▇ HIGH VALUE RATING
- ▒ MODERATE VALUE RATING
- ▇ LOW VALUE RATING
- ▨ BLM OWNERSHIP
- —— WATERSHED BDRY.

Sept. 18, 1996
Dennis Glover

Note: No warranty is made by the Bureau of Land Management as to the accuracy, reliability, or completeness of these data for individual use or aggregate use with other data.

MAP 17: FIRE VALUE RATING in the GRANTS PASS WATERSHED



SCALE 1:104000

LEGEND

▇ AREAS of HIGH RISK, HAZARD, VALUE

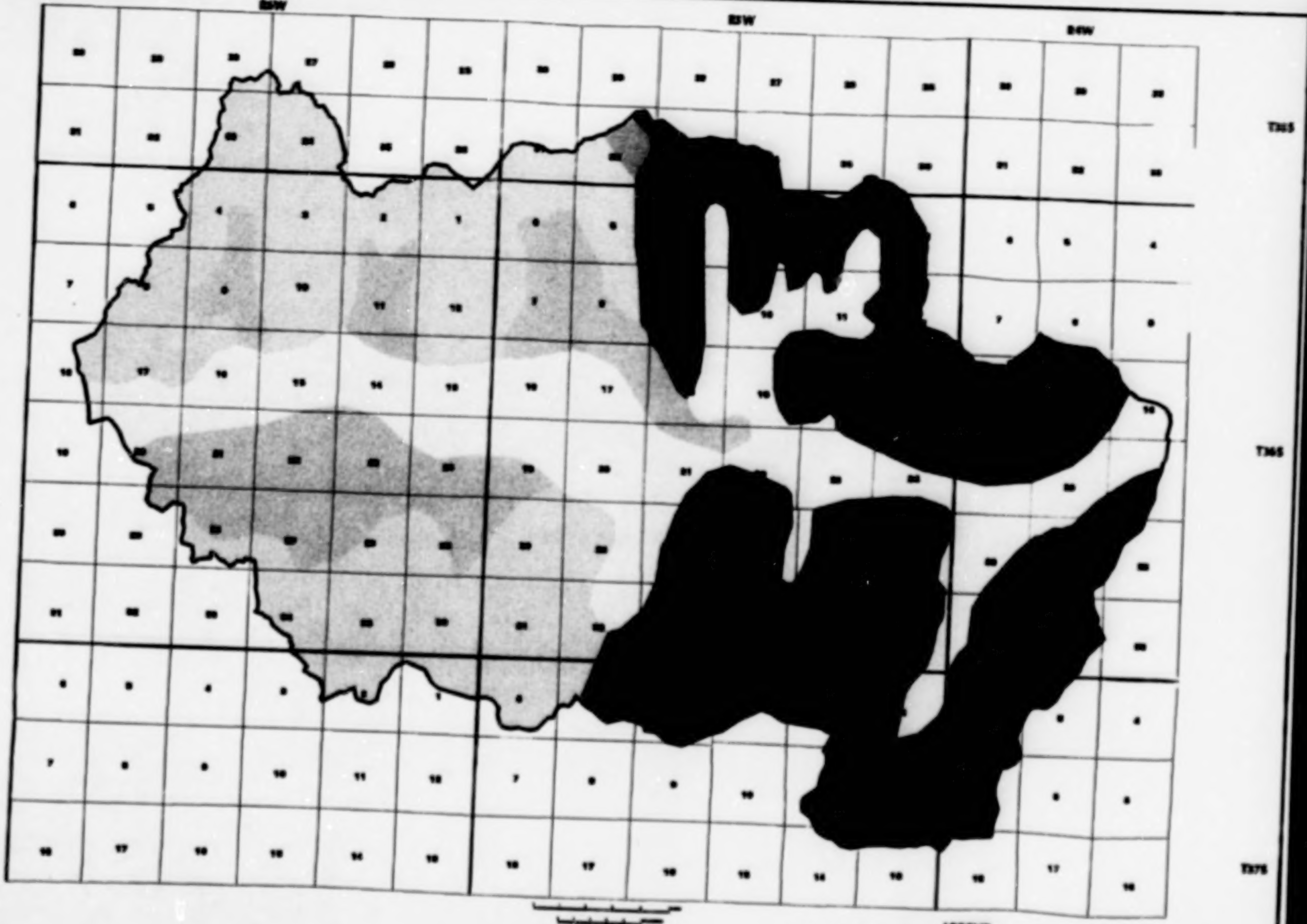
▨ BLM OWNERSHIP

— WATERSHED BDRY.

Sept 18, 1996
Dennis Glover

NOTE: No warranty is made by the Bureau of Land Management as to the accuracy, reliability, or completeness of these data for individual use or aggregate use with other data.

MAP 18: AREAS of HIGH HAZARD,RISK and VALUE-AT-RISK RATINGS



LEGEND

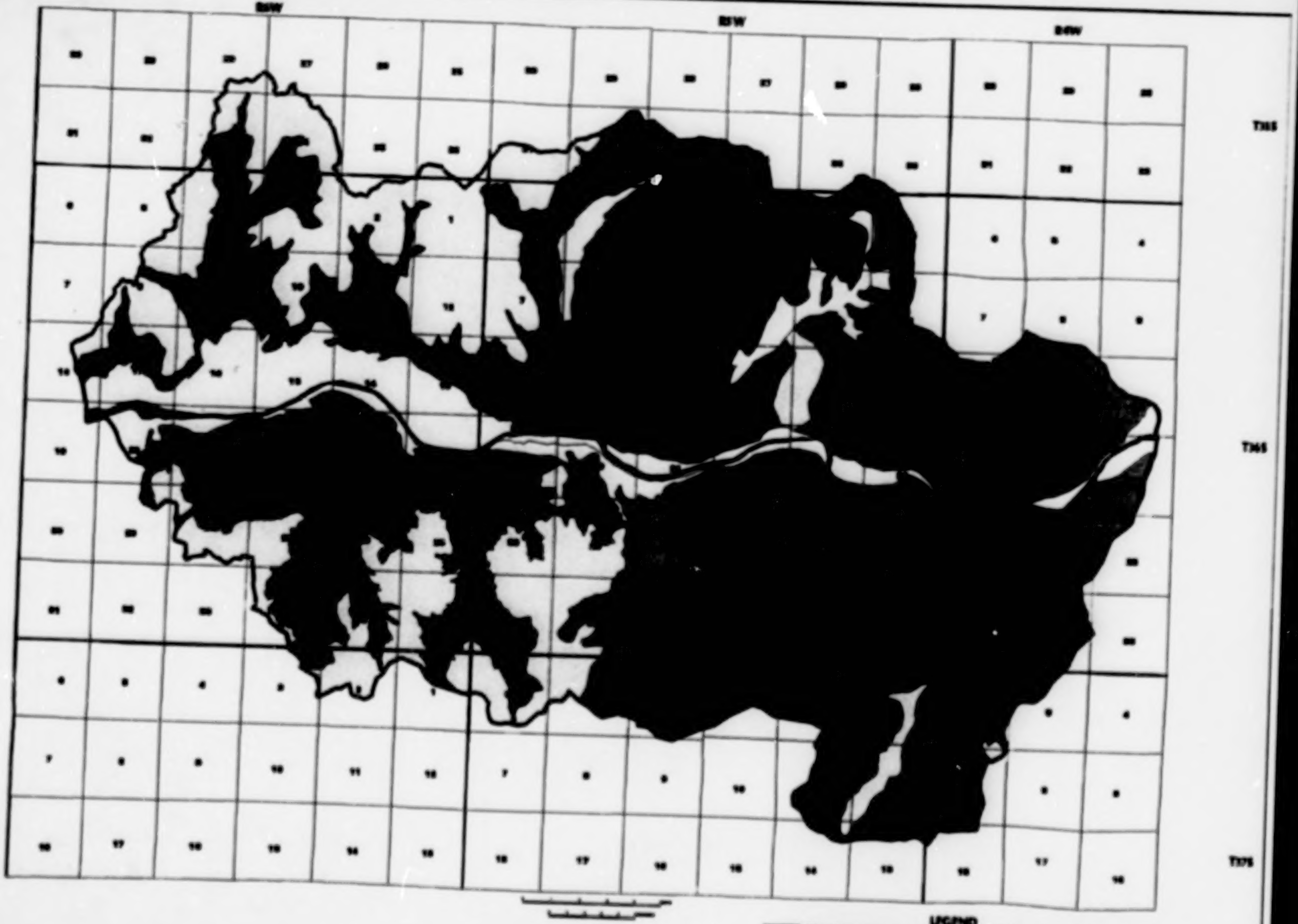
☐	Quaternary Alluvium
▨	Quaternary Fluvium
▨	Tertiary Alluvium
☐	Granitic Intrusives
▨	Serpentine
■	Applegate Metavolcanics
■	Applegate Metamorphics

February 20, 1998
Dennis Glover

Note: No warranty is made by the Bureau of Land Management as to the accuracy, reliability, or completeness of these data for individual use or aggregate use with other data.

MAP 19: GENERAL GEOLOGY IN THE GRANTS PASS WATERSHED

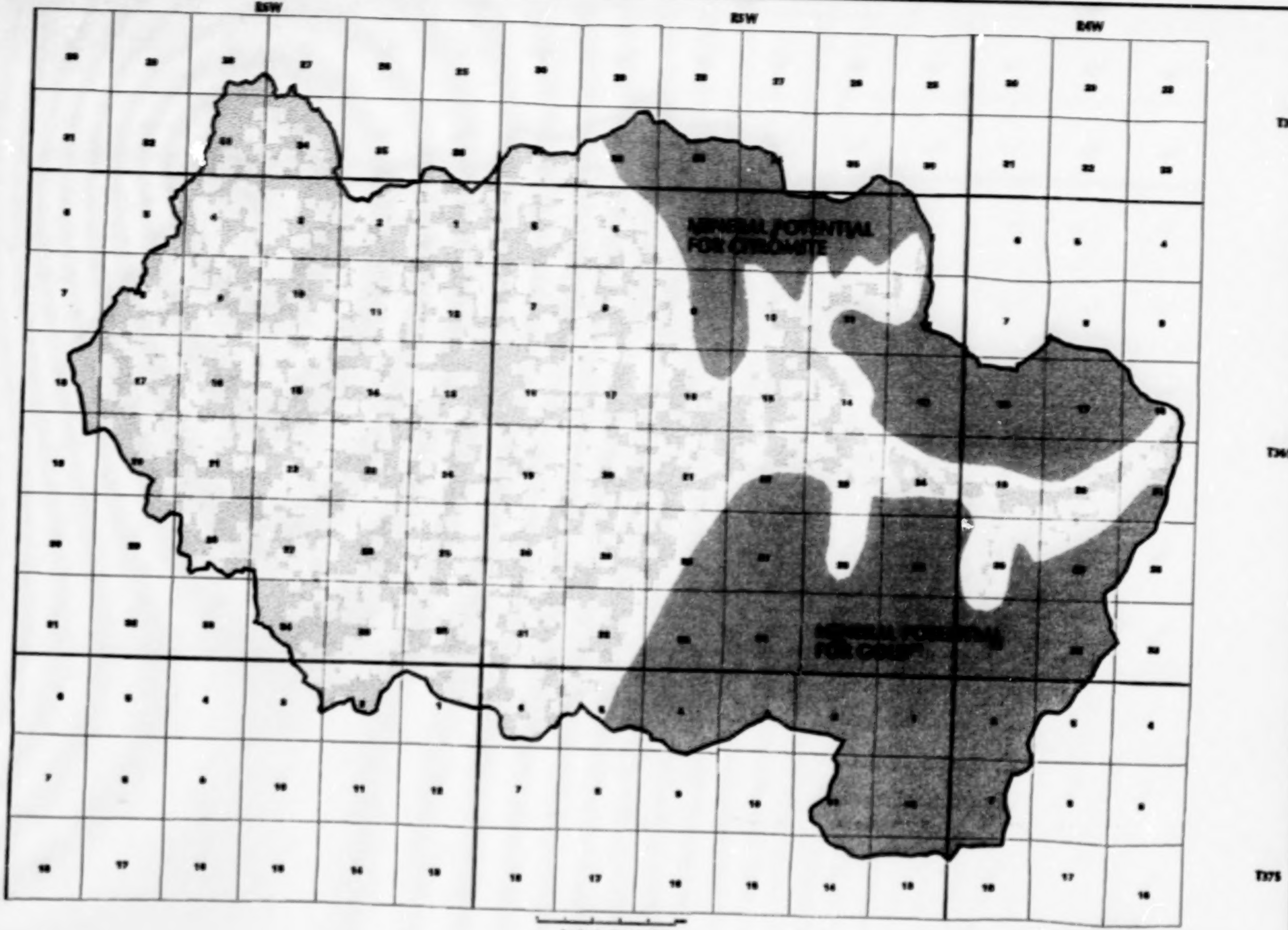
121



August 6, 1990
Dennis Glover

MAP 20: GENERAL SOIL TYPES IN THE GRANTS PASS WATERSHED

122


T35S
T36S
T37S
MINERAL POTENTIAL FOR CHROMITE
MINERAL POTENTIAL FOR GOLD

SCALE 1:104000

LEGEND
▨ HIGH MINERAL POTENTIAL
▨ MEDIUM MINERAL POTENTIAL
☐ LOW MINERAL POTENTIAL
— WATERSHED BDRY.

July 12, 1996
Dennis Glover

Note: No warranty is made by the Bureau of Land Management as to the accuracy, reliability, or completeness of these data for individual use or aggregate use with other data.

MAP 21: MINERAL POTENTIAL IN THE GRANTS PASS WATERSHED

Appendix B: Mining Claim Information

A mining claimant, or operator, has the right to prospect and develop the mining claim as authorized through the General Mining Laws and amendments. Acceptable activities that normally occur on mining claims include the development of the mineral resources by extracting the gold bearing gravels, or ore, from the claim and manufacturing of the mineral materials utilizing a trammel and sluice box system, or a millsite of some sort. After the gold is extracted the tailings (waste material) are stockpiled to either be utilized in the reclamation of the site or removed to an appropriate location. Timber on site may be used in some situations if outlined in a mining notice or plan of operations.

The operator, or claimant, will be allowed to build structures and occupy the site where such uses are incidental to mining and approved in writing by the appropriate BLM authorized officer. The use and occupancy of a mining claim will be reviewed on a case-by-case basis to determine if such uses are incidental. A letter of concurrence will be issued only where the operator shows that the use or occupancy is incidental to mining; where substantially regular mining activity is occurring; and will be subject to the operator complying with all state, federal, and local governmental codes and regulations. This means that in addition to meeting the requirements to mine on a regular basis the claimant will need to meet the standards of the Oregon Uniform Building Codes and all state sanitation requirements.

The filing of mining claims gives the claimant the rights, ownership, of the minerals beneath the surface of the lands encumbered by the mining claims. In most cases, management of the surface of the claims rests with the appropriate federal agency with jurisdiction.

The claimants/operators have the rights to use that portion of the surface necessary in the development of the claim. In the cases where the surface of the claims are administered by the BLM or Forest Service the claimant/operator may, for safety or security reasons, limit the public access at the location of operations. Where there are no safety or security concerns the surface of the mining claims are open to the public.

In some instances the surface of the mining claim is managed by the claimant. These are usually claims that were filed before August, 1955 and determined valid at that time. The claimants in these cases have the same rights as outlined above, however, they have the right to eliminate public access across that area where they have surface rights.

Appendix C: Road Information

BLM road conditions/status in the Grants Pass Watershed are summarized in Table C-1. Definitions of terms used and data elements in the table precede the table.

A. Definition of Terms

BLM Capitalized Roads: The BLM analyzes Bureau-controlled roads to determine capitalized or non capitalized classification. During this analysis, the BLM considers many elements including the present and future access needs, type of road, total investment, and the road location, to reach a conclusion of classification of the road. Each capitalized road is identified with a BLM road number and a capitalized value. BLM capitalized roads are managed and controlled by the BLM.

BLM Non-Capitalized Roads and Skid Trails: BLM non-capitalized roads and skid trails are not assigned a capitalized value. Non-capitalized roads are generally jeep roads and spur roads that exist due to intermittent public and administrative use. Skid trails are ground disturbances, created under a timber sale, that have not been restored to their natural surrounding environment.

Non-BLM Roads and Skid Trails: Non- BLM roads and skid trails are administered by private landowners and\or other government agencies. The BLM has no control over these roads.

Quarries: Quarries are areas of land suitable for use as a rock source to develop aggregate material for the surfacing of roads, rip rap for slope protection, rock for stream enhancement projects and other miscellaneous uses.

Road Maintenance Level: The extent and intensity of road maintenance scheduled for a road.

> **Level 1:** This level is the minimal custodial care as required to protect the road investment, adjacent lands, and resource values. Normally, these roads are blocked and not open for traffic or are open only to restricted traffic. Traffic would be limited to use by high clearance vehicles, passenger car traffic is not a consideration. Culverts, waterbird/dips and other drainage facilities are to be inspected on a three-year cycle and maintained as needed. Grading, brushing, or slide removal is not performed unless they affect roadbed drainage. Closure and traffic restrictive devices are maintained.
>
> **Level 2:** This level is used on roads where management requires the road to be opened seasonally or for limited passage of traffic. Traffic is generally administrative with some moderate seasonal use. Typically these roads are passable by high clearance vehicles. Passenger cars are not recommended as user comfort and convenience are not considered priorities. Culverts, waterbird/dips and other drainage facilities are to be inspected annually and maintained as needed. Grading is conducted as necessary only to correct drainage problems. Brushing is conducted as needed (generally on a three-year cycle) only to facilitate passage of maintenance equipment. Slides

may be left in place provided that they do not affect drainage and there is at least 10 feet of usable roadway.

Level 3: This level is used on intermediate or constant service roads where traffic volume is significantly heavier approaching an Average Daily Traffic of 15 vehicles. Typically these roads are native or aggregate surfaced, but may include low use bituminous surfaced road. This level would be the typical level for log hauling. Passenger cars are capable of using most of these roads, by traveling slow and avoiding obstacles that have fallen within the travelway. Culverts, waterbird/dips and other drainage facilities are to be inspected annually and maintained as needed. Grading is conducted annually to provide a reasonable level of riding comfort. Brushing is conducted annually or as needed to provide concern for driver safety. Slides affecting drainage would receive high priority for removal, otherwise they will be removed on a scheduled basis.

Level 4: This level is used on roads where management requires the road to be opened all year and have a moderate concern for driver safety and convenience. Traffic volume is approximately an Average Daily Traffic of 15 vehicles and will accommodate passenger vehicles at moderate travel speeds. Typically these roads are single lane bituminous surface, but may also include heavily-used aggregate surfaced roads as well. The entire roadway is maintained on an annual basis, although a preventative maintenance program may be established. Problems are repaired as soon as discovered.

Level 5: This level is used on roads where management requires the road to be opened all year and have a high concern for driver safety and convenience. Traffic volume is exceeds an Average Daily Traffic of 15. Typically these roads are double or single lane bituminous, but may also include heavily-used aggregate surfaced roads as well. The entire roadway is maintained on an annual basis and a preventative maintenance program is also established. Brushing may be conducted twice a year as necessary. Problems are repaired as soon as discovered.

B. Road Records Data Elements

Information on road data elements is available through the Medford District road record files, right-of-way (R/W) agreement files, easement files, computer road inventory program, GIS maps, transportation maps, aerial photos and employee knowledge of existing road systems. When data gaps are determined to exist, field data will be gathered to eliminate the gaps and at the same time existing data element information will be verified. Some information on private roads does exist, but the majority will need to be researched by the BLM through privately-authorized field investigations and answers to BLM's request for information from private land.

1. Examples of data elements for roads:

   road density
   road drainage
   R/W agreements
   road surface
   road condition
   easements
   surface depth
   road grade
   maintenance levels
   road use
   gates
   barricades

2. Examples of data elements for quarries:

   active quarry
   depleted quarry

C. Descriptions of Columns in Road Information Table

T. = Township
R. = Range
Sec. = Section
Seg. = Road Segment

These columns describe the road number, location of the beginning point of the road, and the road segment. Example of a road number is: 35-7-24 A

Name = The name of the road.
O&C = Length of road in miles that crosses O&C lands.
PD = Length of road in miles that crosses Public Domain lands.
Other = Length of road in miles that crosses other lands.
Total Miles = Total length of the road in miles.
Srf. Type = Road surface type: (NAT) Natural, (PRR) Pit Run, (GRR) Grid Rolled, (ABC) Aggregate Base Course, (ASC) Aggregate Surface Course, (BST) Bituminous Surface Treatment.
Sub. Wid. = Subgrade width of the road in feet.
Srf. Dp. = Road surfacing depth in inches.
Who Ctrls. = Who controls the road. (BLM) Bureau of Land Management, (PVT) Private.
Cus. Mtn. = BLM Custodial Maintenance Level. Level of maintenance needed during normal administrative use with no timber haul.
Opr. Mtn. = BLM Operational Maintenance Level. Level of maintenance needed during active timber hauling.
Who Mtn. = This column changes based on who's responsible for maintaining the road at any given time. (BLM) Bureau of Land Management, (PVT) Private, (TSO) Timber Sale Operator, or Other.
Comments = Comments pertaining to each road.

Table C-1: Grants Pass Watershed Road Information

T.	R.	Sec.	Seg.	Name	O&C	PD	Other	Total Miles	Srf. Type	Sub. Wid.	Srf. Dp.	Who Ctrls	Cus Mtn.	Opr. Mtn.	Who Mtn.	Road Standard
35S	5W	26	B	Louse Mountain	3.20	.00	.00	3.20	ASC	14'	4"	BLM	3	3	BLM	SL
35S	5W	26.2	B	Jones Creek	2.79	.00	.06	2.85	PRR	14'	6"	BLM	3	3	BLM	SL
35S	5W	33	A	Jones South Spur	.34	.00	.00	.34	NAT	12'		BLM	1	1	BLM	SL
35S	5W	33	B	Jones South Spur	.00	.00	.05	.05	NAT	12'		BLM	2	3	BLM	SL
35S	5W	33	C	Jones North Spur	.00	.05	.00	.05	NAT	12'		BLM	2	3	BLM	SL
35S	5W	33	D	Jones North Spur	.44	.00	.00	.44	NAT	12'		BLM	2	3	BLM	SL
35S	5W	33.2		Jones Spur	.28	.00	.00	.28	NAT	14'		BLM	1	1	BLM	SL
35S	5W	33.3		Jewitt Mine	.13	.00	.11	.24	NAT	12'		BLM	1	1	BLM	SL
35S	5W	33.4		Qualim Spur	.66	.00	.00	.66	PRR	14'	6"	BLM	3	3	BLM	SL
35S	5W	35.3		Louse Mountain ML	1.46	.00	.00	1.46	GRR	17'	6"	BLM	3	3	BLM	SL
36S	4W	7.1	B2	Upper Left Spur	.52	.00	.00	.52	NAT	14'		BLM	3	3	BLM	SL
36S	4W	7.1	C	Upper Left Spur	.64	.00	.07	.71	NAT	14'		BLM	2	2	BLM	SL
36S	4W	16	A	Fielder Mountain					NAT			BLM			BLM	SL
36S	4W	16	B	Fielder Mountain					NAT			BLM			BLM	SL
36S	4W	16	C	Fielder Mountain					NAT			BLM			BLM	SL
36S	4W	16	D	Fielder Mountain					NAT			BLM			BLM	SL
36S	4W	17	A	Fielder Mountain					NAT			BLM			BLM	SL
36S	4W	30	A	Savage West	.00	.00	.87	.87	NAT	14'		BLM	1	1	BLM	SL
36S	4W	30	B	Savage West	1.5	.00	.00	1.5	NAT	12'		BLM	1	2	BLM	SL

Table C-1: Grants Pass Watershed Road Information

T.	R.	Sec.	Seg.	Name	O&C	PD	Other	Total Miles	Srf. Type	Sub. Wid.	Srf. Dp.	Who Ctrls	Cus Mtn	Opr. Mtn.	Who Mtn.	Road Standard
36S	4W	30	C	Savage West	.00	.00	.25	.25	NAT	12'		BLM	1	2	BLM	SL
36S	4W	30	D	Savage West	.08	.00	.00	.08	NAT	12'		BLM	1	2	BLM	SL
36S	4W	30	E	Savage West	.00	.00	.25	.25	NAT	12'		BLM	1	2	BLM	SL
36S	4W	30	F	Savage West	1.00	.00	.00	1.00	NAT	12'		BLM	1	2	BLM	SL
36S	4W	32	A	Birdseye North #2					NAT			BLM			BLM	SL
36S	5W	12.1		North Fiddler A Spur	1.13	.00	.06	1.19	NAT	14'		BLM	2	2	BLM	SL
36S	5W	23		Greens Creek	1.15	.00	.00	1.15	NAT	14'		BLM	2	2	BLM	SL
36S	5W	33	A	Mt. Baldy	.00	.00	.50	.50	PRR	14'	6"	BLM	1	3	BLM	SL
36S	5W	33	B	Mt. Baldy	.00	.30	.00	.30	PRR	14'	6"	BLM	1	3	BLM	SL
36S	5W	33	C	Mt. Baldy	.00	.50	.00	.50	PRR	14'	6"	BLM	1	3	BLM	SL
36S	5W	35		Greens Creek Spur	.60	.00	.00	.60	NAT	14'		BLM	2	2	BLM	SL
36S	5W	35.1	A	Greens Creek Spur	.19	.00	.00	.19	NAT	14'		BLM	2	3	BLM	SL
36S	6W	17		Stewart Spur	.26	.00	.00	.26	NAT	14'		BLM	2	2	BLM	SL
37S	4W	5.1	A	Owl Hollow					NAT			BLM			BLM	SL
37S	4W	5.1	B	Owl Hollow					NAT			BLM			BLM	SL
37S	4W	5.2		Divide North					GRR			BLM			BLM	SL
37S	4W	5.3	A	Birdseye North Spur					NAT			BLM			BLM	SL
37S	4W	5.3	B	Birdseye North Spur					NAT			BLM			BLM	SL
37S	4W	7	A	Divide South Road					GRR			BLM			BLM	SL
37S	4W	7.1		Upper Savage #7					NAT			BLM			BLM	SL

Table C-1: Grants Pass Watershed Road Information

T.	R.	Sec.	Seg.	Name	O&C	PD	Other	Total Miles	Srf. Type	Sub. Wid.	Srf. Dp.	Who Ctrls	Cut Mtn	Opr. Mtn.	Who Mtn.	Road Standard
37S	4W	18.1		Savage Creek Helispot					NAT			BLM			BLM	SL
37S	5W	1	A	Savage Creek	.70	.00	.00	.70	ASC	16'	4"	BLM	3	3	BLM	SC
37S	5W	1	B1	Savage Creek	.62	.00	.00	.62	ASC	16'	4"	BLM	3	3	BLM	SC
37S	5W	1	B2	Savage Creek	.80	.00	.00	.80	PRR	16'	6"	BLM	2	3	BLM	SL
37S	5W	1	C	Savage Creek	1.14	.14	.00	1.28	PRR	16'	6"	BLM	2	3	BLM	SL
37S	5W	1	D	Savage Creek	.00	.28	.00	.28	NAT	16'		BLM	2	3	BLM	SL
37S	5W	1	E	Savage Creek	.00	.00	.13	.13	NAT	14'		BLM	2	3	BLM	SL
37S	5W	1	F	Savage Creek	.65	.00	.41	1.06	NAT	14'		BLM	2	3	BLM	SL
37S	5W	1	G	Savage Creek					NAT			BLM			BLM	SL
37S	5W	1.1	A1	Lower Savage Creek	.00	.00	.51	.51	NAT	16'		BLM	2	3	BLM	SL
37S	5W	1.1	A2	Lower Savage Creek	.00	.00	.55	.55	NAT	16'		BLM	2	3	BLM	SL
37S	5W	1.1	B	Lower Savage Creek	.62	.00	.00	.62	NAT	16'		BLM	2	3	BLM	SL
37S	5W	1.1	C	Lower Savage Creek	1.02	.00	.00	1.02	NAT	16'		BLM	2	3	BLM	SL
37S	5W	1.2		Savage Creek A Spur	.70	.00	.00	.70	NAT	14'		BLM	2	3	BLM	
37S	5W	9		Luther Divide Jeep	1.98	.00	1.32	3.30	NAT	14'		BLM	2	3	BLM	
37S	5W	11	A	Lower Savage Creek A	.44	.00	.00	.44	NAT	14'		BLM	2	3	BLM	
37S	5W	11	B	Lower Savage Creek A	.00	.00	.09	.09	NAT	14'		BLM	2	3	BLM	
37S	5W	11	C	Lower Savage Creek A	.37	.00	.08	.45	NAT	14'		BLM	2	3	BLM	
37S	5W	11.1		Lower Savage Creek B	.50	.00	.00	.50	NAT	14'		BLM	2	3	BLM	
37S	5W	12		Savage Creek P	.64	.00	.46	1.10	NAT	14'		BLM	2	3	BLM	

Table C-1: Grants Pass Watershed Road Information

T.	R.	Sec.	Seg.	Name	O&C	PD	Other	Total Miles	Srf. Type	Sub. Wid.	Srf. Dp.	Who Ctrls	Cus Mtn	Opr. Mtn.	Who Mtn.	Road Standard
37S	5W	13		Savage Pass A Spur	.22	.00	.00	.22	NAT	14'		BLM	2	3	BLM	
37S	5W	14	A	Oscar Creek	.00	.44	.00	.44	PRR	14'	6"	BLM	2	3	BLM	
37S	5W	14.1	A	Savage Creek West	.59	.11	.00	.70	NAT	14'		BLM	2	3	BLM	
37S	5W	14.1	B	Savage Creek West	.49	.00	.00	.49	NAT	14'		BLM	2	3	BLM	

Appendix D: Fish Habitat Survey Information

Aquatic habitat survey data in the Grants Pass Watershed is quite limited. This is, in part, due to the land ownership patterns and the relatively small amount of BLM-administered lands. BLM data has been collected in three streams.

Table D-1: Bloody Run Creek

Reach	Fish	Temp (C)	Gradient (Percent)	LWD (Pieces/100m)	Aver. Pool Depth (ft)	Percent SSO	Percent Canopy cover
1	none	13.5	16	1.3	0.34	26	15
2	none	15.5	19	0.4	0.26	16	60

Data Source: ODFW 1996

Table D-2: Savage Creek

Reach	Spawning Gravels (% embedded)	Percent Sand
1	10	10
2	30	20
3	40	20
4	75	75

Data source: BLM Stream Survey for Savage Green Timber Sale 1996

Table D-3: Bee Creek

Reach	Spawning Gravels (Percent embedded)	Percent Sand
1	25	10

Data source: BLM Stream Survey for Savage Green Timber Sale 1996

Table D-4: Jones Creek

Reach	Holding Pools	LWD
1	none	low

Data source: BLM stream survey for Bloody Jones timber sale 1996

Appendix E: Wildlife Information

Table E-1: Spotted Owl Sites Located within the Watershed

Site Name	Level of Protection
Fielder Creek	100 acre core
Greens Creek	100 acre core
Little Savage Creek	100 acre core
Savage Coffey	100 acre core
Savage Joe	100 acre core

Table E-2: Spotted Owl Sites Located Outside the Watershed with Provincial Home Range Partially in the Watershed

Site Name	Level of Protection
Granite Key	100 acre core
Lousy Ida	100 acre core
Shilohs Rock Mine	Seasonal Operating restriction

Table E-3: Spotted Owl Habitat Availability for Known Sites as of 1995

Site Name	MSNO	Bureau-Administered Habitat within 0.7 Miles (Acres)	Bureau -Administered Habitat within 1.3 Miles (Acres)	Percent Suitable Within 1.3 Miles
Fielder Creek	2658	414	896	26%
Granite Key	3291	338	1,070	31%
Greens Creek	1945	1,314	444	13%
Little Savage Creek	2076	639	237	7%
Lousy Ida	0886	306	1,026	30%
Savage Coffey	4041	212	742	21%
Savage Joe	3290	505	1,205	35%
Shilohs Rock Mine	3933	353	944	27%

Table E-4: Results of Nesting Surveys in the Grants Pass Watershed

SITE NAME	86	87	88	89	90	91	92	93	94	95	96
Fielder Creek	SU	SU	SU	SU	SU	S	X	P	P/2	P	P
Greens Creek	X	P	X	X	X	X	S	X	X	NS	P
Little Savage Creek	SU	SU	SU	S	S	X	NS	X	X	NS	NS
Savage Coffee	SU	SU	SU	SU	SU	SU	SU	P	P/1	PU	P/2
Savage Joe	SU	SU	SU	SU	SU	SU	SU	X	X	NS	NS

NS = NOT SURVEYED
X = NO BIRDS PRESENT
P/# = PAIR/NUMBER YOUNG PRODUCED
P = PAIR NOT NESTING
PU = PAIR NEST STATUS UNKNOWN
SU = SITE UNKNOWN
U = UNKNOWN
SI = SURVEY INCOMPLETE
S = SINGLE BIRD

McKelvey Rating System

Spotted owl habitat managed by the Bureau of Land Management has been analyzed using the McKelvey rating system. The McKelvey rating system is based on a model that predicts spotted owl population based on habitat availability. Stands are examined for criteria such as canopy layering, canopy closure, snags, woody material and other features. Biological potential of a stand to acquire desired conditions is also taken into consideration. During the winter and spring of 1996, stands were visually inspected and rated into six habitat categories. This rating system has some serious shortcomings and does not reflect the actual amount of habitat. Factors not considered are connectivity and fragmentation. For instance a single acre of optimal habitat surrounded by clearcuts is as valuable in this rating system as an acre of optimal connected to hundreds of acres. Despite the shortcomings this system reflects the best available data at this time.

Special Status Species

Special status species are animals that are recognized by the federal or state government as needing particular consideration in the planning process, due to low populations (natural and human caused), restricted range, threats to habitat and for a variety of other reason. This list includes species officially listed, proposed for listing. State Listed Species are those species identified as threatened, endangered, or pursuant to ORS 496.004, ORS 498.026, or ORS 546.040. Also included are Bureau-assessment species which are plants and animals species that are found on List 2 of the Oregon Natural Heritage Database and those species on the Oregon List of Sensitive Wildlife Species (ORS 635-100-040) and are identified in BLM Instruction Memo No. OR-91-57. Bureau-sensitive species are those species eligible for federally listed, state listed, or on List 1 in the Oregon Natural Heritage Database, or approved by the BLM state director.

Table E-5: Special Status Species Habitat Needs

Species (Common Name)	Habitat Association	Special Habitat Feature	Concern
Gray Wolf	Generalists	Large Blocks of Unroaded Habitat	Extirpated.
White-Footed Vole	Riparian	Alder/Mature Riparian	Naturally rare, modification/loss of habitat from development.
Red Tree Vole	Mature/Old-Growth Conifer	Mature Douglas-Fir Trees	Declining habitat Quality/Quantity from logging.
California Red Tree Vole	Mature/Old-Growth Conifer	Mature Douglas-Fir Trees	Declining habitat Quality/Quantity from logging.
Fisher	Mature/Old-Growth Riparian	Down Wood/Snags	Declining habitat Quality/Quantity and fragmentation from logging.
California Wolverine	Generalists	Large Blocks of Unroaded Habitat	Declining habitat Quality/Quantity and fragmentation from logging and road building, human disturbance.
American Martin	Mature/Old Growth	Down Wood, Living Ground Cover	Declining habitat Quality/Quantity and fragmentation.
Ringtail	Generalists	Rocky Terrain, Caves, Mine Adits	Northern limit of range.
Townsends Big-Eared Bat	Generalists	Mine Adits, Caves	Disturbance to nurseries, hibernacula and roosts, closing mine adits.
Fringed Myotis	Generalists	Rock Crevices and Snags	Disturbance to roosts and colonies.
Yuma Myotis	Generalists	Large Live Trees with Crevices in the Bark	Limited mature tree recruitment.
Long-eared Myotis	Generalists	Large Live Trees with Crevices in the Bark	Limited mature tree recruitment.
Long-legged Myotis	Generalists	Large Live Trees with Crevices in the Bark	Limited mature tree recruitment.
Pacific Pallid Bat	Generalists	Snags, Rock Crevices	General rarity/Disturbance/Snag loss.
Peregrine Falcon	Generalists	Cliff Faces	Low numbers, prey species. Contaminated with pesticides.
Bald Eagle	Lacustrine/Rivers	Large Mature Trees with Large Limbs near Water	Populations increasing.
Northern Spotted Owl	Mature/Old Growth	Late-Successional Mature Forest with Structure	Declining habitat Quality/Quantity and fragmentation.
Marbled Murrelet	Mature/Old Growth	Large Limbed Trees, High Canopy Closure.	Declining habitat Quality/Quantity and fragmentation.
Northern Goshawk	Mature/Old Growth	High Canopy Close Forest for Nest Sites	Declining habitat Quality/Quantity and fragmentation, human disturbance.
Mountain Quail	Generalists		No concern in the watershed.
Pileated Woodpecker	Large Trees	Large Diameter Snags	Snag and down log removal from logging, salvage and site prep.

Table E-5: Special Status Species Habitat Needs

Species (Common Name)	Habitat Association	Special Habitat Feature	Concern
Lewis' Woodpecker	Pine/Oak Woodlands	Large Oaks, Pines and Cottonwoods Adjacent to Openings	Declining habitat Quality/Quantity fire suppression, rural and agriculture development, riparian modification.
White-headed Woodpecker	Pine/fir Mountain Forests	Large Pines Living and Dead	Limited natural populations, logging of large pines and snags
Flammulated Owl	Pine/oak Woodlands	Pine Stands and Snags	Conversion of mixed-aged forest to even-aged forests
Purple Martin	Generalists	Snags in Burns with Excavated Cavities	Salvage logging after fire and fire suppression
Great Gray Owl	Pine/Oak/True Fir/ Mixed Conifer	Mature Forest with Adjoining Meadows	Declining quality/quantity of nesting and roosting habitat
Western Bluebird	Meadows/Open Areas	Snags in Open Areas	Snag Loss/fire Suppression Competition with Starlings for Nest Sites
Acorn Woodpecker	Oak Woodlands	Large Oaks	Declining Habitat Quality/Quantity
Tricolored Blackbird	Riparian	Wetlands, Cattail Marshes	Limited and dispersed populations, habitat loss from development
Pygmy Nuthatch	Pine Forests	Large Dead & Decaying Pine	Timber harvest of mature trees, salvage logging.
Black-backed Woodpecker	Pine	Snags and Pine	Removal of mature insect infested trees.
Williamsons Sapsucker	Montane Conifer Forest	Trees with Advanced Wood Decay	Removal of heart rot trees, snag removal, conversion to managed stands.
Northern Pygmy Owl	Mixed Conifer/	Snags	Snag removal, dependent on woodpecker species to excavate nest cavities.
Grasshopper Sparrow	Open Savannah	Grasslands with Limited Shrubs	Limited habitat, fire suppression, conversion to agriculture.
Bank Swallow	Riparian	Sand Banks near Open Ground or Water	General rarity, declining habitat quality.
Western Pond Turtle	Riparian/uplands	Marshes, Sloughs Ponds	Alteration of aquatic and terrestrial nesting habitat, exotic species introduction.
Del Norte Salamander	Mature/Old Growth	Talus	Declining habitat Quality/Quantity and fragmentation.
Siskiyou Mountain Salamander	Closed Canopy Forest	Talus	Declining habitat Quality/Quantity and fragmentation.
Foothills Yellow-legged Frog	Riparian	Permanent Streams with Gravel Bottoms	Water diversions, impoundments, general declines in genus numbers.
Red-Legged Frog	Riparian	Marshes, ponds and Streams with Limited Flow	Exotic species introduction loss of habitat from development.
Tailed Frog	Riparian	Cold Fast Flowing Streams in Wooded Area	Sedimentation and removal of riparian vegetation due to logging, grazing and road building.
Clouded Salamander	Mature	Snags & down Logs	Loss of large decaying wood due to timber harvest and habitat fragmentation

Table E-5: Special Status Species Habitat Needs

Species (Common Name)	Habitat Association	Special Habitat Feature	Concern
Variegated Salamander	Riparian	Cold, Clear Seeps & Springs	Water diversions and sedimentation from roads and logging.
Black Salamander	Generalists	Down Logs, Talus	Limited range, lack of data.
Sharptail Snake	Valley Bottoms Low Elevation	Moist Rotting Logs	Low elevation agricultural and development projects that removes/limits down wood.
California Mountain Kingsnake	Habitat Generalists	Habitat Generalists	Edge of range, general rarity, collectors.
Common Kingsnake	Habitat Generalists	Habitat Generalists	Edge of range, general rarity, collectors.
Northern Sagebrush Lizard	Open Brush Stands	Open Forests or Brush with Open Understory	Edge of range, fire suppression.

Table E-6: Meadows on Federally-Managed Lands (Grants Pass Watershed)

T-R-S-OI	Condition/Comment	Recommendation
T36S-R5W-12 011	105 acres, mix of oak and pine	Reestablish fire
T35S-R5W-09 004	Near freeway, a few meadows	Reestablish fire
T36S-R5W-03 002	3 Acre meadow	Reestablish fire
T35S-R5W-32 003	Jeffrey Pine savannah	Reestablish fire
T35S-R5W-34 002	Located in late-successional stand	Reestablish fire
T35S-R5W-33 005	Meadow bisected by road	Reestablish fire
T35S-R5W-35 017	6 acre meadow	Reestablish fire
T35S-R6W-03 002	Small meadows on valley floor	Reestablish fire
T35S-R6W-03 001	Old clearcut unit small meadows	Reestablish fire
T36S-R6W-09 003	Valley bottom, oak savannah	Reestablish fire
T36S-R5W-13 001	Lots of open grassland	Reestablish fire

Table E-7: Pine Habitat on Federally-Managed Lands (Grants Pass Watershed)

Location	Condition/Comment	Recommendation
T36S-R5W-09 002	36 acres overstory 1847 birthdate	Reestablish fire/remove encroaching vegetation.
T36S-R5W-09 001	94 acres overstory 1827 birthdate	Reestablish fire/remove encroaching vegetation
T36S-R5W-17 001	40 acres overstory 1887 birthdate	Reestablish fire/remove encroaching vegetation
T36S-R5W-05 002	Burned in 1962	Remove encroaching vegetation
T36S-R6W-01 001	17 acres sugar and Ponderosa	Reestablish fire/remove encroaching vegetation
T36S-R6W-01 002	124 acres withdrawn land	Reestablish fire/remove encroaching vegetation
T36S-R6W-01 004	200 acres withdrawn land	Reestablish fire/remove encroaching vegetation
T36S-R6W-04 001	161 acres valley bottom land	Reestablish fire/remove encroaching vegetation
T36S-R6W-05 001	78 acres valley bottom land	Reestablish fire/remove encroaching vegetation
T36S-R6W-09 001/002	Scattered pine in brush stands	Maintain chaparral community through fire/promote pine reproduction
T36S-R6W-17 001	78 acres sugar and Ponderosa	Reestablish fire/remove encroaching vegetation
T36S-R5W-02 oo5	22 acres mix of Douglas-fir and Ponderosa	
T36S-R5W-02 006	19 acres mix of Douglas-fir and Ponderosa	
T36S-R5W-04 003	38 acres burned in 1962	Remove encroaching vegetation
T36S-R5W-09 003	12 acres birthdate in 1847	Reestablish fire/remove encroaching vegetation
T36S-R5W-09 004	170 acres mix with oak and fir	Reestablish fire/remove encroaching vegetation
T36S-R5W-11 001	28 acres fir and pine	Reestablish fire/remove encroaching vegetation
T36S-R5W-11 002	31 acres fir and pine	Reestablish fire/remove encroaching vegetation
T36S-R5W-11 004	Pine and fir 1927 birthdate	Reestablish fire/remove encroaching vegetation
T36S-R5W-13 001	593 acres pine and fir	Reestablish fire/remove encroaching vegetation
T36S-R5W-14 004	Pine, brush, and grass	Reestablish fire/remove encroaching vegetation
T36S-R5W-15 001	49 acres 1912 birthdate	Reestablish fire/remove encroaching vegetation
T36S-R5W-15 002	31 acres fir and pine	Reestablish fire/remove encroaching vegetation
T36S-R4W-17 006	88 acres pine and madrone withdrawn land	Reestablish Fire/remove encroaching vegetation
T36S-R4W-19 003	10 acres pine and fir	Reestablish fire/remove encroaching vegetation
T36S-4W-20 003	18 acres pine and fir	Reestablish fire/remove encroaching vegetation

Table E-8: Oak Habitat on Federally-Managed Lands (Grants Pass Watershed)

Location/OI	Condition/Comment	Recommendation
T36S-R5W-09 001	94 acre mix of oak, pine and fir	Evaluate for control burn.
T36S-R5W-09 003	12 acres oak and pine mix	Evaluate for control burn.
T36S-R5W-09 004	170 acres mixed with pine and fir	Evaluate for control burn.
T36S-R5W-09 005	17 acres of oak and grass	Evaluate for control burn.
T36S-R5W-10 002	5 acres mixed with fir	Evaluate for control burn.
T36S-R5W-13 001	593 acres of oak, pine, fir and *Ceanothus*	Evaluate for control burn.
T36S-R4W- 17 008	13 acres	Evaluate for control burn.
T36S-R4W-18 001	46 acres	Evaluate for control burn.
T36S-R4W-18 002	34 acres of oaks	Evaluate for control burn.
T36S-R4W-20 002	12 acres	Evaluate for control burn.
T36S-R4W-20 001	49 acres	Evaluate for control burn.
T36S-R4W-19 002	171 acres	Evaluate for control burn.
T36S-R4W-19 001	97 acres	Evaluate for control burn.
T36S-R4W-28 003	8 acres	Evaluate for control burn.
T36S-R4W-28 004	38 acres	Evaluate for control burn.
T36S-R4W-29 001	113 acres	Evaluate for control burn.
T36S-R4W-29 009	48 acres	Evaluate for control burn.
T36S-R4W-31 004	30 acres	Evaluate for control burn.
T36S-R4W-32 002	21 acres	Evaluate for control burn.

Table E-9: Chaparral Habitat on Federally-Managed Lands (Grants Pass Watershed)

Location	Condition/Comment	Recommendation
T36S-R5W-14 004	*Cenanothus*, pine, oak, grass 230 acres	Review for possible control burn
T36S-R5W-12 011	105 acres Jeffrey pine, oak and *Cenanothus*	Review for possible control burn
T35S-R5W-31 004	201 acres chaparral mixed with California black oak/ sugar pine, visible from freeway.	Review for possible control burn
T36S-R6W-09 001/002	Clearcut in 1961, dominated by manzanita.	Review for possible control burn
T36S-R5W-13 001	593 acres mixed chaparral mixed with pine, oak and fir.	Review for possible control burn

Table E-10: Known Springs on BLM-Managed Land in the Grants Pass Watershed

Location	OI/Comment
T36S-R4W-Sec 20 NE of NW	OI 003/001
T36S-R4W-Sec 29 NW of SE	OI 002/003
T36S-R4W-Sec 29 SW of NE	OI 001/004
T36S-R4W-Sec 31 SE of SE	OI 006
T36S-R4W-Sec 32 NW of NE	OI 003
T36S-R5W-Sec 04 NE of SW	OI 002
T36S-R5W-Sec 12 NW of SW	OI 005/008
T36S-R5W-Sec 25 SW of SW	OI 005
T36S-R5W-Sec 25 NW of SE	OI 005
T36S-R5W-Sec 34 NW of NW	OI 002 Flows to SW
T36S-R5W-Sec 35 SE of NE	OI 002
T36S-R5W-Sec 5 SE of NE	OI 004 Headwaters of creek
T36S-R6W-Sec 3 SW of SW	OI 002 on south section line
T36S-R6W-Sec 17 NE of NW	OI 001
T37S-R4W-Sec 6 SE of NE	OI 003
T37S-R4W-Sec 7 SE of NW	OI 003
T37S-R5W-Sec 1 SW of SW	
T37S-R5W-Sec 14 NE of NE	Water crosses road
T37S-R5W-Sec 12 NW of NW	OI 001

Other Species and Habitats

Cavity dependent species and species utilizing down logs are of special concern in the watershed. Historically snags were produced by various processes including drought, windthrow, fires, and insects. The amount of snags fluctuated through time in response to these events. This natural process has largely been interrupted by demands for timber harvest. The potential recovery of snag dependent sensitive species such as the pileated woodpecker will depend on the ability of the federal agencies to manage this resource. Silvicultural practices have historically focused on even-aged stands and have resulted in deficits of snags and down logs in harvested areas. Other activities that have depleted snags and down logs are site preparation for tree planting (particularly broadcast burning), fuelwood cutting, post-fire salvage, and previous entries for mortality salvage. Managed stands that currently contain 10-12 (5 MBF) overstory trees per acre or less, are also of concern from a wildlife tree/down log perspective. Stands with remaining overstory trees have the potential to provide for current and future snag/down log requirements throughout the next rotation if existing trees are removed.

Snags and down logs provide essential nesting/denning, roosting, foraging, and hiding cover for at least 100 species of wildlife in western Oregon (Brown, *et al*, 1985). For some species, the presence or absence of suitable snags will determine the existence or localized extinction of that species. In forested stands, cavity nesting birds may account for 30%-40% of the total bird population (Raphael and White 1984). The absence of suitable snags (snags decay stage, number and distribution) can be a major limiting factor for these snag dependent species.

The hardness (decay stage) of a snag is an important factor in determining its foraging, roosting and nesting use by individual species. Woodpeckers, like the pileated woodpecker *(Dryocous pileatus)* often choose hard snags (Stage 1) for nesting where as wrens and chickadees use the softer stage 2 and 3 snags. The use of snags as a foraging substrate also changes with time and the decay stage of the snag. As a snag decomposes the insect communities found within it changes. Evans and Conner (1979) identified three foraging substrates provided by snags: the external surface of the bark, the cambium layer and the heartwood of the tree.

Snags are also used as food storage sites and as roosting/resting sites for many species. A variety of mammals, birds and some owls use snags to cache prey and other food items. Vacated nesting cavities are often used by wildlife for protection from inclement weather or on hot summer days. The marten *(Martes americana)* often use snags as resting and hunting sites and a pileated woodpecker may use up to 40 different snags for roosting.

Snags continue their function as a key element of wildlife habitat when they fall to the ground as down logs. Once again, down log use by individual species is dependent on the decay stage of the log. The larger the diameter of the log and the longer its length the more functional it is for wildlife. Depending on the decay stage of the log it will be used for lookout and feeding sites, nesting and thermal cover, for food storage or for foraging. For example species like the clouded salamander *(Aneides ferreus)* require the micro-habitat provided by bark sloughing of the log where as small mammals such as red-backed voles *(Clethrionomys occidentalis)* burrow inside the softer logs.

Past and future management Bureau of Land Management policy as outlined in the current Resource Management Plan (RMP) target at maintaining primary cavity nesting species at 40% of their naturally occurring population levels (biological potential). Maintaining biological potential at 40% is considered to be the minimal viable population level for any given species. By managing for primary cavity nesters at 40% biological potential we have also managed for many other snag and dependent species, such as flying squirrels *(Glaucomys sabrinus)*, mountain bluebirds *(Sialia currucoides)* and Vaux's swift *(Chaetura vauxi)* at an unknown level. Managing for populations at 40% biological potential does not allow for species flexibility in adapting to changing environments or to major environmental events such as wildfire or long-term climatic change. In addition, managing at 40% biological potential does not meet BLM policy guidelines for those species where we are trying to restore, maintain and enhance existing populations (Manual 6840).

Appendix F: Historical Vegetation

Table F-1: Vegetation Condition Circa 1920 (Interpretation of the 1920 Revestment Notes)

Legal	Survey/ Mo./Yr	Volume	Volume Percent	Old Growth	Plant Series	Burn	Misc	Remarks
35-5-31								
SE SE	9/14/16	NT		AG				Oak, pine, fir, madrone
SW SE	9/14/16	2 MBF	PP - 100	AG	DF			Madrone, oak
NW SE	9/14/16	7 MBF	DF-60,SP-13, PP-27		DF			Dense fir
NE SW	9/14/16	265 MBF	DF-75,SP-10, PP-15		DF			Good second growth timber
SE SW	9/14/16	NT	64	AG				Oak, madrone
SW SW	9/13/16	95 MBF	DF-60, PP-35M, M	AG	DF			Madrone, brush, good DF regen.
NW SW	9/13/16	50 MBF	DF-25M, PP-25M	AG	PP			Madrone, oak
35-5-33								
SE NE	5/21/43	4	DF-93, PP-7	N	DF			Logged w/cat. Timber sale disturbance. Good regeneration
SW NE	9/16/16	5	PP-25,C-5, DF-70	N	DF		X	Logged w/cat. Timber sale disturbance. Good regeneration
NW NE								
NE SE	9/16/16	25 MBF	D. Fir, 100		DF		X	Brush over entire 40.
SE SE	9/19/16	10 MBF	PP-100		PP		X	Brush over entire 40.
SW SE	9/16/16	15 MBF	PP-100		PP			Brush over entire 40.
NW SE	9/16/16	20 MBF	PP-100		PP		X	Brush over entire 40.
NE SW	9/16/16	50 MBF	PP-100		DF		X	Brush over entire 40.
SE SW	9/16/16	10 MBF	PP-100		PP		X	Brush over entire 40.
NW SW	9/16/16	NT			DF		X	Some brush third growth.
35-5-33								
NE NW	9/17/16	290 MBF	PP-20, C-10, DF-260		DF		X	
SE NW	9/17/16	150 MBF	DF-80		DF		X	
SW NW	9/17/16	180 MBF	PP-150, DF-30		PP		X	
NW NW	9/17/16	290 MBF	PP-25,DF-260, C-10		DF		X	
35-5-34								
Sections unreadable	4/9/43	363 MBF	DF-280, SP-3, PP-80, BDFT		DF			
	4/9/43	220 MBF	DF-100		DF			
35-6-27								
SE SE	10/4/16	NT						Fruit raised.

Table F-1: Vegetation Condition Circa 1920 (Interpretation of the 1920 Revestment Notes)

Legal	Survey/ Mo./Yr	Volume	Volume Percent	Old Growth	Plant Series	Burn	Misc	Remarks
SW SE	10/4/16	NT						
35-6-33								
NE NE	10/3/16	105 MBF	PP-75,000, SP-30,000		PP	X		New growth
35-6-33								
SE NE	10/3/16	NT	Oak, DF, PP			X		Firewood and manzanita
SW NE	10/3/16	95 MBF	SP-35,000		PP			
NE SE	10/4/16	NT				X		Oak, pine firewood
SE SE	10/4/16	NT				X		Oak, pine firewood
SW SE	10/4/16	NT				X		Oak, pine firewood
NW SE	10/4/16	NT						
SE SW	10/3/16	NT				X		Pine, oak firewood
NE NW	10/2/16	NT				X		Oak, pine firewood
SE NW	10/2/16	NT				X		Oak, pine firewood
SW NW	10/2/16	NT				X		Oak, pine firewood
NWNW	10/2/16	NT				X		Pine, oak firewood
36-4-17								
SE SE	9/10/16	NT				X		PP, DF firewood
SW SE	9/10/16	NT				X		Firewood
NE SW	9/10/16	NT						Brushy
SE SW	9/10/16	NT					X	Firewood
SW SW	9/10/16	NT						Laurel and scrub oak
36-4-17								
NW SW	9/10/16	NT						Thick brush
NE NW	9/10/16	200 MBF	DF-1, SP-3, PP-2		DF			Thick underbrush
SE NW	9/10/16	100 MBF					X	
SW NW	9/10/16	NT					X	
NWNW	9/10/16	250 MBF	DF-1, SP-3, PP-2		DF			Thick brush
36-4-19								
SE NE	9/10/16	NT						Thick brush
SW NE	9/10/16	NT						Scrub timber
NW NE	9/10/16	25 MBF	PP-100		PP			

Table F-1: Vegetation Condition Circa 1920 (Interpretation of the 1920 Revestment Notes)

Legal	Survey/ Mo./Yr	Volume	Volume Percent	Old Growth	Plant Series	Burn	Mine	Remarks
NE SE	9/10/16	NT						Scrub timber
NW SE	9/10/16	NT						Scrub timber
NE SW	9/10/16	20 MBF	PP-100		PP			Scrub timber
NW SW	9/10/16	50 MBF	PP-100		PP			Scrub timber
NE NW	9/10/16	30 MBF	PP-100		PP			Scrub timber
SE NW	9/10/16	25 MBF	PP-100		PP			Scrub timber
SW NW	9/10/16	20 MBF	PP-100		PP			Scrub timber
NWNW	9/10/16	15 MBF	PP-100		PP			Scrub timber
36-4-19								
Lot 3	9/10/16	65 MBF	PP-100		PP			
Lot 4	9/10/16	NT						Scrub
36-4-21								
SW NE	8/6/16	50 MBF	PP-20, DF-30		DF			Third growth
NW NE	9/6/16	95 MBF	PP-65, DF-30		PP			Third growth
NE SW	9/6/16	80 MBF	PP-30, DF-50		DF			Dense growth
SE SW	9/6/16	55 MBF	PP-20, SP-5,DF-30		DF			Dense growth
SW SW	9/6/16	75 MBF	PP-40, DF-35		PP			Dense growth
NW SW	9/6/16	85 MBF	PP-45, DF-40		PP			Dense growth
37-4-7								
NE NE	9/24/16	NT						Very little vegetation
NW NE	9/24/16	NT						Very little veg.; steep & rocky
SE NE	9/24/16	NT						Granite
SW NE	9/24/16	125MBF	DF-75, PP-50		DF			
NE SE	9/24/16	260 MBF	PP-100		PP			
NW SE	9/24/16	280 MBF	PP-100		PP			Scrub oak, laurel
NE SW	9/24/16	240 MBF	PP-100		PP			Scrub oak, laurel
37-4-7								
NW SW	9/24/16	180 MBF	PP-100		PP			
SW SW	9/24/16	180 MBF	DF-100		DF			Poor quality wood
SE SW	9/24/16	280 MBF	DF-100		DF			Poor quality wood
SE NW	9/24/16	200 MBF	PP-50, DF-150		DF			Water in creek for stock

Table F-1: Vegetation Condition Circa 1920 (Interpretation of the 1920 Revestment Notes)

Legal	Survey/ Mo./Yr	Volume	Volume Percent	Old Growth	Plant Series	Burn	Mine	Remarks
SW NW	9/24/16	210 MBF	DF-150, PP-60		DF			White oak, black oak
NWNW	9/24/16	160 MBF	DF-60, PP-100		PP			
NE NW	9/24/16	100 MBF	DF-100		DF			Oak, madrone, young DF
36-5-1								
NE SW	10/7/16	60 MBF	DF-15, SP-25, PP-20		PP			DF, oak and madrone, 2000 cedar posts
SE SW	10/7/16	80 MBF	PP-70, SP-10		PP			1500 cedar posts, young pine
SW SW	10/7/16		DF-20, PP-50		PP			500 cedar posts, oak & madrone firewood, young pine
NW SW	10/7/16		150 cords, DF, PP		DF			Young fir, pine
NE NW	10/7/16	70 MBF	DF-40, PP-30		DF			Young fir, pine
SE NW	10/7/16	70 MBF	DF-30, PP-25, SP-15		DF			
NWNW	10/7/16		DF-50, PP-15, SR-15		DF			Oak
36-5-3								
NE NE	10/7/16	80 MBF	PP-60, DF-20		PP	X		
SE NE	10/7/16	45 MBF	PP-33, DF-12		PP			
SW NE	10/7/16	99 MBF	PP-76, DF-23		PP			
NW NE	10/7/16	43 MBF	PP-28, SP-6, DF-9		PP			
NE SE	10/7/16	66 MBF	PP-57, DF-9		PP			
SE SE	10/7/16	33 MBF	PP-20, DF-13		PP			
SW SE	10/7/16	80 MBF	PP-46, DF-16, SP-18		PP			
NW SE	10/7/16	117.5 MBF	PP-87, SP-7.5, DF-23		DF			Second growth fir
NE SW	10/7/16	74 MBF	PP-60, DF-14		PP			
SW SW	10/7/16	64 MBF	PP-38, SP-10, DF-16		PP			Small Jack pine
NW SW	10/7/16	39 MBF	PP-21, SP-5, DF-13		PP			Small Jack pine poles
NE NW	5/2/33	105 MBF	PP-75, DF-30		DF			Second growth DF
SE NW	5/2/33	100 MBF	PP-60, DF-40		DF			Second growth DF
SW NW	10/7/16	34 MBF	PP-21,SP-6,DF-8		PP			Second growth timber
NWNW	10/7/16	47.6 MBF	PP-25, SP-7,DF-15		PP			Small Jack pine
36-5-5								
SE NE	10/8/16	NT						40 cords of wood
SW NE	10/8/16	NT						35 cords of wood

Table F-1: Vegetation Condition Circa 1920 (Interpretation of the 1920 Revestment Notes)

Legal	Survey/ Mo./Yr	Volume	Volume Percent	Old Growth	Plant Series	Burn	Mine	Remarks
NE SE	10/8/16	NT						40 cords of wood; brushy
NW SE	10/8/16	NT						25 cords of wood; brushy
36-5-7	10/8/16	NT		AG		X		35 cords of wood
NW NE	10/9/16	NT						Dense, small fir and pine, 100 cords of wood
SW SW	10/9/16	NT						75 cords of wood
NE NW	10/18/18	5 MBF	PP-100		PP			Dense brush
SE NW	10/18/18	40 MBF	PP-30, DF-5, SP-5		PP			
SW SW	10/9/16	NT						75 cords of wood
NWNW	10/18/18	5 MBF	PP-100		PP			Dense brush
36-5-9								
SW NE	10/8/16	29 MBF	PP-24, DF-5		PP			Brushy
NW NE	10/8/16	60.2 MBF	PP-51.2, DF-9		PP			Brushy
36-5-9								
SE SE	10/19/18	20 MBF	PP-100	AG	PP			Brushy
SW SE	10/8/16	NT						Brushy; 25 cords of wood
NW SE	10/8/16	NT						Brushy, 60 cords of wood
NE SW	10/8/16	NT					X	Brushy, 55 cords of wood
SE SW	10/8/16	24.4 MBF	PP-18.4, DF-6		PP		X	Brushy
SW SW	10/8/16	NT		AG				Brushy, 20 cords of wood
NW SW	10/8/16	NT		AG				Brushy, 20 cords of wood
NE NW	10/8/16	38 MBF	PP-32, DF-6		PP			Brushy with small trees
SE NW	10/8/16	29 MBF	PP-24, DF-5		PP			Brushy
SW NW	10/8/16	NT		AG				Brushy, 25 cords of wood
NWNW	10/8/16	NT						Brushy, 35 cords of wood
36-5-11								
NW NE	10/8/16	NT					X	Brushy, 65 cords of wood
NE SE	10/8/16	NT		AG				300 cords of wood; fir, pine, oak, madrone and cedar
SE SE	10/8/16	NT		AG				Brushy, 250 cords of wood
SW SE	10/8/16	NT		AG				Brushy, 200 cords of wood
SE SW	10/8/16	NT		AG				Fir, pine, oak, madrone, 200 crds

Table F-1: Vegetation Condition Circa 1920 (Interpretation of the 1920 Revestment Notes)

Legal	Survey/ Mo./Yr	Volume	Volume Percent	Old Growth	Plant Series	Burn	Mine	Remarks
36-5-13								
NE NE	10/9/16	NT		AG				Fir, Jack pine, madrone,100 crds
SE NE	10/9/16	NT		AG				Oak, madrone
SW NE	10/9/16	NT		AG				Oak, madrone
NW NE	10/9/16	NT						Brush, 75 cords
NE SE	10/9/16	NT						Oak, madrone
SE SE	10/9/16	NT						Oak, madrone
SW SE	10/9/16	NT						Oak, madrone
NW SE	10/9/16	NT						Oak, madrone
NE SW	10/9/16	NT						Oak, madrone
SE SW	10/9/16	NT						Fir, oak, madrone
SW SW	10/9/16	NT						Pine, oak, madrone, 100 cords
NW SW	10/9/16	NT						Oak, madrone
NE NW	10/9/16	NT						Oak, madrone
SE NW	10/9/16	NT						Oak, madrone
SW NW	10/9/16	NT						Oak, madrone
NWNW	10/9/16	NT						Oak, madrone
36-5-15								
SE NE	10/8/16	NT					X	Madrone
36-5-19								
SE SE	10/10/16	NT		AG				Young pine
SW SE	10/10/16.	NT		AG				Young pine
NE SW	10/20/18	10 MBF	PP-100	AG	PP			
SE SW	10/20/18	NT		AG				
SW SW	10/20/18	10 MBF	PP-100	AG	PP			Brush
NE NE	10/9/16	NT		AG		X		Brushy, 25 cords of wood
NW NE	10/9/16	NT		AG		X		Brushy
LOT 8	10/10/16	NT						Young fir, oak
36-5-21								
LOT 7	10/23/18	NT		AG				
SE SE	10/10/16	NT						Dense young fir

Table F-1: Vegetation Condition Circa 1920 (Interpretation of the 1920 Revestment Notes)

Legal	Survey/ Mo./Yr	Volume	Volume Percent	Old Growth	Plant Series	Burn	Mine	Remarks
SW SE	10/23/18	NT		AG				
36-5-23								
LOT 8	10/10/16	NT		AG				Oak and pine
SE SW	10/10/16	NT		AG				Young fir, pine and oak
36-5-25								
NE NE	11/28/18	190 MBF	PP-60, DF-130					Young pine, fir; brushy
SE NE	11/28/18	115 MBF	PP-80, DF-35		PP			Brushy
SW NE	11/29/18	180 MBF	PP-100, DF-80		PP			Brushy
NE SE	5/9/45	20 MBF	PP-100		PP			
SE SE	5/9/45	5 MBF	SP-100		SP			
SW SE	5/5/45	340 MBF	PP-125,SP-20,DF-185, IC-10		DF			
NW SE	11/29/18	100 MBF	PP-75, DF-25		PP			Brushy
NE SW	11/29/18	250 MBF	PP-130, DF-120		DF			
SE SW	5/9/45	290 MBF	PP-40,SP-5,DF-205, C-40		DF			
SW SW	5/9/45	305 MBF	PP-55, SP-10,DF-220, IC-20		DF			
NW SW	1/46	171 MBF	PP-75,SP-6, DF-80 C-10		DF			First mention of species as
SE NW	1/46	330 MBF	PP-15, DF-180		DF			First mention of species as
SW NW	1/46	300 MBF	PP-40, SP-10, DF-250		DF			First mention of species as
NWNW	11/29/18	120 MBF	PP-30, SP-20, DF-70		DF			Brushy
36-5-29								
NW SE	10/9/16	NT				X		Brush, scrub oak
SE SW	10/9/16	30 MBF	DF-100		DF			Scrub oak and pine
SW SW	10/9/16	15 MBF	PP-100		PP			Scrub oak and wild grass
SW NW	11/2/18	25 MBF	PP-100		PP			
36-5-31								
NE NE	10/8/16	NT						Scrub oak, pine
SW NE	10/8/16	NT				X		Madrone
NW NE	10/9/16	NT				X		Scrub oak, pine, wild grass
SE NE	10/8/16	NT						Scrub oak, pine, wild grass

Table F-1: Vegetation Condition Circa 1920 (Interpretation of the 1920 Revestment Notes)

Legal	Survey/ Mo./Yr	Volume	Volume Percent	Old Growth	Plant Series	Burn	Mine	Remarks
NE SE	10/8/16	20 MBF	PP-100		PP	X		Scrub oak, pine, wild grass
SW SE	11/2/18	20 MBF	PP-100	AG	PP			
NW SE	10/8/16	NT		AG		X		Scrub pine, wild grass
36-5-33								
SW NE	10/9/16	NT		AG				Scrub timber
NE SE	10/9/16	NT						Young fir
NWNW	10/23/18	50 MBF	PP-100	AG	PP			Brush
SW SE	11/2/18	40 MBF	PP-100	AG	PP			Brush
36-5-35								
NE NE	11/45	560 MBF	DF-345, 1C-25, PP-190		DF			
SE NE	11/45	720 MBF	PP-685, DF-35		DP			
SW NE	12/1/18	75 MBF	PP-100		PP			Brushy
NW NE	12/1/18	200 MBF	PP-100		PP			Brushy
NE SE	11/45	275 MBF	PP-225, 1C-5,DF-45		PP			Pine, DF - less than 22"
SE SE	11/45	480 MBF	PP-230, DF-225,1C-25		PP			
SW SE	12/1/18	300 MBF	PP-240, DF-60		PP			
NW SE	12/1/18	125 MBF	PP-25, DF-100		DF			Brushy
NE SW	12/2/18	45 MBF	PP-20, DF-25		DF			Brushy
SE SW	12/2/18	300 MBF	PP-140, DF-160		DF			Brushy
SW SW	12/2/18	350 MBF	DF-100		DF			Brushy
NW SW	12/2/18	450 MBF	DF-100		DF			Brushy
NE NW	12/2/18	150 MBF	PP-50, DF-100		DF			Brushy
SE NW	12/2/18	50 MBF	DF-100		DF			Brushy
SW NW	12/2/18	200 MBF	DF-100		DF			Brushy
NWNW	12/2/18	225 MBF	DF-100		DF			
36-6-1								
NE NE	10/13/16	NT						Pine, oak, madrone
SE NE	10/13/16	NT						DF, oak, pine, madrone, 200 crds
SW NE	10/13/16	NT		AG				Pine, oak, madrone
NW NE	10/13/16	NT						Pine, oak, madrone, 100 cords
SE SE	10/13/16	NT		AG				Pine, oak, madrone

Table F-1: Vegetation Condition Circa 1920 (Interpretation of the 1920 Revestment Notes)

Legal	Survey/ Mo./Yr	Volume	Volume Percent	Old Growth	Plant Series	Burn	Mine	Remarks
SW SE	10/13/16	NT						Pine, oak, madrone
NW SE	10/13/16	NT						Fir-pine, oak, madrone, 75 cords
NE SW	10/14/16	NT		AG				Oak, madrone
SE SW	10/14/16	NT		AG				
SW SW	10/26/18	35 MBF	PP-20, DF-15		PP			Brush
NW SW	10/14/16	NT		AG				Oak, madrone
SE NW	10/14/16	NT						Young pine, oak, madrone
SW NW	10/14/16	NT				X		Oak, madrone
NWNW	10/14/16	NT						Pine, oak: 100 cords
36-6-3								
NE NE	10/12/16	NT						Logged 15 yrs ago, scrub timber
SE NE	10/12/16	NT				X		Logged 15 yrs ago, scrub timber
SW NE	10/12/16	NT				X		Logged 15 yrs ago, scrub timber
NW NE	10/12/16	15 MBF	PP-100		PP	X		Logged 15 yrs ago, scrub timber
SE SE	10/12/16	NT				X		Scrub timber
SE SE	10/12/16	NT				X		Scrub timber
NE SW	10/12/16	NT				X		
NE NW	10/12/16	NT				X		Scrub timber
SE NW	10/12/16	NT				X		Scrub timber
SW NW	10/12/16	NT				X		Scrub timber
NWNW	10/12/16	NT				X		Scrub timber
36-6-5								
SE NE	10/11/16	65.2 MBF	PP-35, SP-14.4, DF-14		PP			
SW NE	10/11/16	36.5 MBF	PP-24.5, DF-12		PP			Brushy
NE SW	10/11/16	NT						Brushy; 50 cords
SE SW	10/11/16	34 MBF	PP-21, SP-5,DF-8		PP	X		Brushy
NE SE	10/11/16	56 MBF	PP-32, SP-13, DF-11		PP			Brushy, 150 cedar posts
SW SE	10/11/16	49.8 MBF	PP-35, SP-4.8, DF-10		PP			Brushy
NW SE	10/11/16	45 MBF	PP-24,SP-12,DF-7		PP			Brushy
36-6-5								
SE SE	10/11/16	60.4 MBF	PP-34.4, SP-12, DF-14		PP	X		Brushy

Table F-1: Vegetation Condition Circa 1920 (Interpretation of the 1920 Revestment Notes)

Legal	Survey/ Mo./Yr	Volume	Volume Percent	Old Growth	Plant Series	Burn	Mine	Remarks
SW SW	10/11/16	NT				X		Brushy;40 cords, 200 cedar posts
NW SE	10/11/16	50 MBF	PP-28,SP-8,DF-14		PP			Brushy
NE NW	10/11/16	40 mbf	PP-21,SP-7,DF-12		PP			Brushy
SE NW	10/11/16	53 MBF	PP-35,SP-8,DF-10		PP			Brushy
SW NW	10/11/16	41 MBF	PP-28, DF-13		PP	X		Brushy
36-6-9								
NE NE	10/11/16	NT				X		Logged 15 years ago, scrub pine
SE NE	10/11/16	NT				X		Logged 15 years ago; scrub pine
SW NE	10/11/16	NT				X		Wild grass
NW NE	10/11/16	NT				X		Wild grass
NE SE	10/11/16	NT						Scrub oak, pine
SE SE	10/11/16	NT						Scrub oak, pine
SW SW	10/11/16	NT				X		Logged off-wild grass
36-6-11								
NW NE	10/14/16	41.8 MBF	PP-33.8,DF-8, 100 cedar posts		PP			Brushy
36-6-11								
NE NW	10/14/16	43.2 MBF	PP-36, DF 7.2, 100 cedar posts		PP			Brushy
SE NW	10/14/16	NT	30 cords,100 cedar posts					Brushy
SW NW	10/14/16	NT	40 cords,75 cedar posts					Brushy
NW NW	10/14/16	52 MBF	PP-40,DF-12		PP			Brushy
36-6-17								
NE NE	10/12/16	NT	75 cords, 150 cedar posts					Brushy
NW NE	10/12/16	NT	150 cords,20 poles			X		Brushy
NE NW	10/12/16	NT	150 cords, 200 poles			X		Brushy
SE SW	10/12/16	NT	45 cords, 600 poles					Second growth timber
SW NW	10/12/16	NT	75 cords, 350 poles					Second growth timber
NW NW	10/12/16	47.5 MBF	PP-24.5, SP-10, DF-13		PP			Brushy
36-6-21								
Lot 5	5/28/17	NT		AG				On bank of Rogue River
NE SE	10/11/16	NT		AG				Brushy

Table F-1: Vegetation Condition Circa 1920 (Interpretation of the 1920 Revestment Notes)

Legal	Survey/ Mo./Yr	Volume	Volume Percent	Old Growth	Plant Series	Burn	Mine	Remarks
36-6-21								
SW SE	10/11/16	NT		AG				Manzanita
SE SE	10/11/16	NT		AG				Young pine, fir
NW SE	10/11/16	NT		AG				Young pine, fir
NE SW	10/11/16	NT		AG				Young pine, fir
SE SW	11/4/18	25 MBF	PP-100	AG	PP			Brushy
SW SW	11/4/18	10 MBF	PP-100	AG	PP			Brushy
NW SW	10/11/16	NT		AG				Manzanita, young pine, fir
SE NW	10/11/16	25 MBF	PP-100	AG	PP			Manzanita, young pine, fir
SW NW	10/11/16	25 MBF	PP-100	AG	PP			Manzanita, young pine, fir
36-6-23								
SW NE	10/10/16	25 MBF	PP-100	AG	PP			Pine, oak, manzanita
NE SE	10/20/18	20 MBF	PP-100	AG	PP			Brushy
SE SE	10/20/18	35 MBF	PP-100	AG	PP			Brushy
SW SE	10/10/16	25 MBF	PP-100	AG	PP			Small timber, brush
NW SE	10/20/18	35 MBF	PP-100	AG	PP			Brushy
NE SW	10/10/16	25 MBF	PP-100	AG	PP			Manzanita, oak
NW SE	10/10/16	50 MBF	PP-100	AG	PP			Manzanita, oak
36-6-23								
NE NW	10/10/16	50MBF	PP-100	AG	PP			Manzanita, oak
SE NW	10/10/16	NT		AG				Poor timber, brushy
SW NW	10/10/16	NT		AG				Poor timber, brushy
NW NW	10/10/16	NT		AG				Poor timber, brushy
SW SW	10/10/16	75 MBF	PP-50, SP-25	AG	PP			Brush, poor timber
SE SW	10/10/16	25 MBF	PP-100	AG	PP			Brush, poor timber
36-6-25								
NE NE	10/20/18	NT		AG				Brushy
SE NE	10/20/18	10 MBF	PP-100	AG	PP			Brushy
SW NE	10/11/16	NT						Manzanita, pine, oak
NW NE	10/11/16	NT		AG		X		Brushy, scrub oak
NE SE	10/11/16	NT		AG		X		Pine

Table F-1: Vegetation Condition Circa 1920 (Interpretation of the 1920 Revestment Notes)

Legal	Survey/ Mo./Yr	Volume	Volume Percent	Old Growth	Plant Series	Burn	Mine	Remarks
SE SE	10/11/16	NT		AG		X		Fine
SW SE	10/11/16	NT		AG		X		Pine
NW SE	10/11/16	NT						Poor timber
NE SW	10/11/16	25 MBF	PP-100		PP			Poor pine, oak, laurel
SE SW	10/11/16	NT				X		Poor timber
SW SW	10/11/16	2.5 MBF	PP-100		PP			Poor timber, brushy, manzanita
NW SW	10/11/16	25 MBF	PP-100		PP			Poor pine, oak, laurel
NE NW	10/20/18	30 MBF	PP-100	AG	PP			Brushy, poor timber
SE NW	10/11/16	15 MBF	PP-100		PP			Poor timber, brushy
SW NW	10/11/16	NT		AG				Brushy
NW NW	10/11/16	NT						Few trees, brushy
36-6-27								
NE NE	11/4/18	25 MBF	PP-100	AG	PP			Brushy
SE NE	10/11/16	70 MBF	PP-45,DF-25	AG	PP			Scrub oak, pine, manzanita
SW NE	11/4/18	25 MBF	PP-100	AG	PP			Brushy
NW NE	10/11/16	85 MBF	PP-55, DF-30	AG	PP			Jack pine, manzanita
NE SE	10/11/16	NT		AG				Pine, manzanita
SE SE	10/11/16	NT		AG				Pine, manzanita
SW SE	10/11/16	NT		AG				Pine, manzanita
NW SE	10/11/16	59 MBF	PP-100	AG	PP			Pine, manzanita
NE SW	10/12/16	150 MBF	PP-50, SP-60, DF-46	AG	PP			Oak, manzanita
SE SW	10/12/16	45 MBF	PP-25, DF-10, SF-10		Pp			Oak, manzanita
36-6-27								
SW SW	10/12/16	180 MBF	PP-60, SP-100, DF-20		PP			Oak, manzanita
NW SW	10/12/16	165 MBF	PP-100, SP-40, DF-25		PP			Oak, manzanita
NE NW	11/4/18	20 MBF	PP-100	AG	PP			Brush
SE NW	11/4/18	20 MBF	PP-100	AG				Brush
SW NW	10/12/16	50 MBF	PP-40, DF-10	AG	PP			Oak, manzanita
NW NW	10/12/16	25 MBF	PP-10,SP-5,DF-10	AG	PP			Oak, manzanita
36-6-29								
NE NE	11/4/18	85 MBF	PP-70, DF-15	AG	PP			Brushy

Table F-1: Vegetation Condition Circa 1920 (Interpretation of the 1920 Revestment Notes)

Legal	Survey/ Mo./Yr	Volume	Volume Percent	Old Growth	Plant Series	Burn	Mine	Remarks
SE NE	10/11/16	NT		AG				Manzanita, pine, fir
SW NE	10/11/16	NT		AG				Manzanita, pine, fir
NW NE	10/11/16	50 MBF	PP-25, DF-25		PP			Manzanita, scrub oak
36-6-35								
NE NE	10/10/16	40 MBF	PP-25, SP-15		PP			Poor timber, brushy
SE NE	10/10/16				PP			Pine, fir, oak, manzanita
SE SE	11/09/18	10 MBF	PP-100	AG	PP			Brushy
SW SE	11/09/18	25 MBF	PP-10, SP-15	AG	PP			Brushy
36-6-35								
NE NW	11/09/18	45 MBF	PP-100	AG	PP			Brushy
SE NW	11/09/18	40 MBF	PP-100	AG	PP			Brushy
37-6-1								
NE NE	10/08/16	NT		AG				Brushy
SE NE	10/08/16	NT		AG				Brushy
SW NE	10/31/18	NT		AG				Brushy
NW NE	10/31/18	NT		AG				PP as firewood, brushy
NE NW	10/31/18	25 MBF	PP-100	AG	PP			Brushy
SE NW	10/08/16	NT		AG				Brushy
SW NW	10/08/16	NT		AG				Brushy
NW NW	10/08/16	NT						
37-6-3								
NE NE	10/09/16	125 MBF	PP-75, SP-50	AG	PP			Trees & brush
SE NE	02/28/18	320 MBF	PP-300, DF-20	AG	PP			Brushy
SW NE	10/09/16	NT		AG				Brushy
NW NE	10/09/16	NT		AG				Brushy
37-5-1								
SE NE	10/04/16	95 MBF	PP-15, DF-80		DF			Young fir, oak, madrone
SW NE	10/05/16	35 MBF	PP-20, DF-15		PP			150 cords oak, madrone
NW NE	10/05/16	31.2 MBF	PP-1.2, DF-30		DF			150 cords oak, madrone
NE SE	10/05/16	NT						150 cords oak, madrone, scrub, fir timber

Table F-1: Vegetation Condition Circa 1920 (Interpretation of the 1920 Revestment Notes)

Legal	Survey/ Mo./Yr	Volume	Volume Percent	Old Growth	Plant Series	Burn	Mine	Remarks
SE SE	10/04/16	80 MBF	PP-20, DF-60		PP			100 cords oak, madrone
SW SE	10/04/16	100 MBF	PP-30, DF-70		PP			Oak, madrone
NW SE	10/04/16	55 MBF	PP-25, DF-30		DF			Oak, pine, fir
NE SW	10/04/16	60 MBF	DF-100		DF			Oak, madrone
SE SW	10/04/16	50 MBF	DF-100		DF			Oak, madrone
SW SW	10/04/16	80 MBF	DF-100		DF			Oak, madrone
NW SW	10/04/16	60 MBF	DF-100		DF			Fir, oak, madrone
NE NW	10/05/16	51.5 MBF	PP-1.5, DF-50		DF			125 cords, fir, oak, madrone
SE NW	10/05/16	70 MBF	PP-30, DF-40		PP			Pine, oak, madrone
SW NW	10/05/16	40 MBF	DF-100		DF			60 cords, oak, madrone
NW NW	10/05/16	75 MBF	PP-15, DF-60		DF			Oak, madrone, 500 cedar posts
37-5-3								
NE NE	11/05/18	310 MBF	SP-10, DF-300		DF			Brushy
SE NE	11/05/18	150 MBF	DF-100		DF			Brushy
SW NE	11/05/18	700 MBF	DF-100		DF			Brushy
NWNE	11/05/18	450 MBF	PP-25, DF-425		DF			Brushy
NE SE	11/05/18	240 MBF	PP-40, DF-200		DF			Brushy
NW SE	11/05/18	325 MBF	PP-100,DF-225		DF			Brushy
NE SW	11/05/18	350 MBF	DF-100		DF			Brushy
SW SW	11/05/18	NT						Brushy, fir cordwood
NE NW	11/05/18	200 MBF	PP-175, SP-25		PP			Brushy, fir cordwood
SE NW	11/05/18	300 MBF	DF-100		DF			Brushy, 300 cords
SW NW	11/05/18	310 MBF	PP-60, DF-250		DF			Brushy, 300 cords
NW NW	11/05/18	150 MBF	PP-125, SP-25		PP			Brushy, 300 cords
37-5-5								
SE NE	10/07/16	NT						Second growth timber - oak
NE SE	10/07/16	NT						Scrub oak, pine
NW SE	10/08/16	NT		AG				Scrub oak, pine
NE SW	10/08/16	NT		AG				Scrub oak, pine
NW SW	10/08/16	25 MBF	PP-100		PP	X		Scrub oak, pine
NE NW	10/08/16	NT						Scrub oak, pine, dense fir

Table F-1: Vegetation Condition Circa 1920 (Interpretation of the 1920 Revestment Notes)

Legal	Survey/ Mo./Yr	Volume	Volume Percent	Old Growth	Plant Series	Burn	Mine	Remarks
SW NW	10/08/16	15 MBF	PP-100		PP	X		Scrub oak
NW NW	10/07/16	65 MBF	PP-100		PP	X		Pine, oak, wild grass
37-5-11								
NE NE	11/06/18	130 MBF	PP-75,SP-5,DF-50		PP			Brushy
SE NE	11/06/18	160 MBF	PP-50, SP-10, DF-100		DF			Brushy
SW NE	11/06/18	50 MBF						Brushy
NW NE	11/06/18	NT						Fir - brushy
NE SE	11/06/18	325 MBF	PP-25, DF-300		DF			Brushy
SE SE	11/06/18	600 MBF	DF-100		DF			Brushy
SW SE	11/06/18	475 MBF	PP-75, DF-400		DF			Brushy
NW SE	11/06/18	250 MBF	DF-100		DF			Brushy
NE SW	11/06/18	300 MBF	DF-100		DF			Brushy
SE SW	11/06/18	200 MBF	DF-100		DF			Brushy
37-5-13								
NE NE	10/05/16	NT				X		Oak, standing trees
NW NE	10/05/16	NT				X		Scrub timber
37-4-5								
NW NE	09/22/16	NT						Scrub oak
NE NW	09/23/16	40 MBF	PP-100		PP			White and black oak
37-4-5								
SE NW	09/23/16	150 MBF	PP-50, DF-100		DF			Brushy
SW NW	09/23/16	140 MBF	PP-60, DF-80		DF			Brushy
NW NW	09/23/16	75 MBF	DF-100		DF			Brushy
36-4-7								
SE SE	09/16/16	294 MBF	DF-100		DF			Lodgepole fir, madrone
36-4-29								
NE NE	09/08/16	20 MBF	PP-10, DF-10		PP			Brush, scrub timber
SE NE	09/08/16	35 MBF	PP-20, DF-15					Brush, scrub timber
SW NE	09/08/16	20 MBF	PP-10, DF-10		PP			Brush, scrub timber
NW NE	08/14/30	140 MBF	PP-30, DF-110	AG	DF			Oak, madrone, fir
NE SE	08/08/16	25 MBF	PP-10, DF-15		DF			Brush, scrub timber

Table F-1: Vegetation Condition Circa 1920 (Interpretation of the 1920 Revestment Notes)

Legal	Survey/ Mo./Yr	Volume	Volume Percent	Old Growth	Plant Series	Burn	Mine	Remarks
SE SE	09/08/16	35 MBF	PP-15, DF-20		DF			Brush, scrub timber
SW SE	09/08/16	30 MBF	PP-10, DF-20		DF			Brush, scrub timber
NW SE	09/08/16	30 MBF	PP-10, DF-20		DF			Brush, scrub timber
NE SW	09/08/16	25 MBF	PP-10, DF-15		DF			Brush, scrub timber
SE SW	09/08/16	35 MBF	PP-5, DF-30		DF			Brush, scrub timber
SW SW	09/08/16	25 MBF	PP-10, DF-15		DF			Brush, scrub timber
36-4-29								
NW SW	09/08/16	50 MBF	PP-20, DF-30		DF			Brush, scrub timber
NE NW	09/08/16	25 MBF	PP-20, DF-5	AO	PP			Brush, scrub timber
SE NW	09/08/16	10 MBF	PP-100		PP			Brush, scrub timber
SW NW	09/08/16	NT						Brush, scrub timber
36-4-31								
NE NE	09/09/16	NT						Scrub timber, oak
SE NE	09/09/16	20 MBF	PP-100		PP		X	Scrub timber, oak
SW NE	09/09/16	30 MBF	PP-100		PP			Scrub timber, oak
NW NE	09/09/16	25 MBF	PP-100		PP			Scrub oak, fir timber
NE SE	09/09/16	30 MBF	PP-100		PP			Scrub timber
SE SE	09/09/16	35 MBF	PP-100		PP			Scrub timber
SW SE	09/09/16	25 MBF	PP-100		PP			Scrub timber
NW SE	09/09/16	20 MBF	PP-100		PP			Scrub timber
SE SW	09/09/16	55 MBF	PP-30, DF-25		PP			Scrub oak, fir timber
SW SW	09/09/16	40 MBF	PP-25, DF-15		PP			Scrub timber
NE NW	10/24/18	40 MBF	PP-100		PP			Dense brush
SE NW	09/09/16	40 MBF	PP-25, DF-15		PP			Brush, scrub timber
NW NW	09/09/16	45 MBF	PP-20, DF-25		DF			Brush, scrub timber

Appendix G: Fire Management Planning (Hazard, Risk, and Value at Risk Rating Classification Method and Assumptions)

A. HAZARD

Hazard rating is based on the summation total points assigned based on six elements as follows:

1. Slope:

Percent	Points
0-19	5
20-44	10
45+	25

2. Aspect:

Degree	Points
316-360, 0-67	5
68-134, 294-315	10
135-293	15

3. Position On Slope

	Points
Upper 1/3	5
Mid-Slope	10
Lower 1/3	25

4. Fuel Model:

Model	Points
Grass 1, 2, 3	5
Timber 8	5
Shrub 5	10
Timber 9	15
Shrub 6	20
Timber 10	20
Slash 11	25
Shrub 4	30
Slash 12, 13	30

5. Ladder Fuel Presence: Points

(Use when forest vegetation has DBH of 5" or greater (vegetation condition class 6). Exceptions are possible based on stand conditions.)

Ladder fuel presence:	Points
Ladder fuel absent.	0
Present on less than 1/3 percent of area; vertical continuity can be either less or greater than 50%.	5
Present on 1/3 to 2/3 percent of area; vertical continuity is less than 50%.	15
Present on 1/3 to 2/3 percent of area; vertical continuity is greater than 50%.	25
Present on greater than 2/3 percent of area; vertical continuity is less than 50%.	30
Present on greater than 2/3 percent of area; vertical continuity is greater than 50%.	40

6. Summary Rating:

Points	Hazard Rating
0-45	LOW
50-70	MODERATE
75-135	HIGH

B. RISK

Assigned based on human presence and use, and on lightning occurrence.

HIGH RATING: When human population areas are present on or adjacent within one-quarter mile of the area; area has good access with many roads; relatively higher incidence of lightning occurrence; area has high level of human use.

MODERATE RATING: When area has human access and experiences informal use; area is used during summer and fall seasons as main travel route or for infrequent recreational activities. Lightning occurrence is typical for the area and not notably higher.

LOW RATING: When area has limited human access and infrequent use. Baseline as standard risk, mainly from lightning occurrence with only rare risk of human fire cause.

C. VALUE AT RISK

Best assigned through interdisciplinary process. Based on human and resource values within planning area. Can be based on land allocations, special use areas, human improvements/monetary investment, residential areas, agricultural use, structures present, soils, vegetation conditions, and habitat.

Examples:

> *HIGH RATING*: ACEC, RNA, LSR, Special Status species present, critical habitats, recreation area, residential areas, farming, vegetation condition and McKelvey ratings of 81, 82, 71, 72; vegetation condition of 4 and 5. Caves, cultural, or monetary investment present. Riparian areas.
>
> *MODERATE RATING:* Granitic soils, informal recreation areas and trails. Vegetation and McKelvey rating 85, 75, 65.
>
> *LOW RATING:* Vegetation condition class 1, 2, 3; and vegetation 5, 6, 7 with McKelvey rating 4.

END

08-30-99